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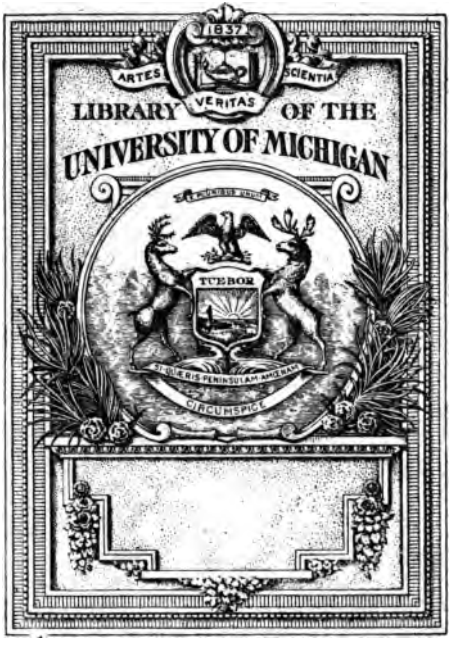

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TEMPERANCE PHYSIOLOGY.

BY

JOHN GUTHRIE, M.A., D.D.,

GLASGOW.

"*Nemo liber est qui corpori servit.*"—SENECA.

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CONTENTS.

CHAPTER I.

INTRODUCTORY.

PAGE

1. *Popular Ignorance of Physiology, and how it is to be dispelled,* 1

Prevailing Ignorance on Laws of Health—These the Industrial Classes most need to know—Who are to Instruct them?—Medical Men—School-books—Ministers—All who can—Author's Aim.

2. *Fundamental Principles,* 6

Materialism of the Day—Evolution—Spheres of Mind and of Matter—Consciousness and Sense—Life, What and Whence?—The Living and Life-giving God.

3. *Man's Place and Responsibility,* 12

Man a Complex Unity—Under Law to both Spheres—Intelligent—Moral—Reason Supreme—Organic Laws and Duty—Application.

4. *General View of the Material World, and of its Relations to the Human Organism,* 19

Of what Elements Composed, it and we—To us, so far as we are Material, a Vital Question—Chemistry, Anatomy, Physiology—Inorganic Kingdom—Organic—Man, and his Fellow Vertebrates.

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CHAPTER II.

Alcohol and the Drinks.

PAGE

1. *Chemical Composition, Character, and Genesis,* . . . 26

Name — Family — Composition — Derivations—Genesis—Peculiarities—States—The Essential Ingredient of all Strong Drinks.

2. *Fermentation,* 30

Process—Rationale—Brewing—Varieties of Result.

3. *Distillation,* 34

Process—Principle—Spirit as Distilled—Rectified—Absolute, how Obtained—Proof—Pervades all Strong Drinks—Art of Distillation has proved a Frightful Curse.

4. *Alleged Virtues of Wine,* 36

"Promotes Purity of the Blood"—Does it?—Dons the Physician's Cloak—Ignorance and Delusion—Wine Recommenders, Commercial and Professional—Their Confessions and Mutual Computations—Vine Disease—What in Wine is Therapeutic?—Maturation—Pliny's Perplexities and Exposures in regard to Ancient Wines—Ancient Wine Delusions—Same thing still—Hollinshed—Old Vintages.

5. *The Sherry Controversy of* 1872, ... 47

Accident at Blackburn—Consequent Discussion on Wines—Fortification Question—*Saturday Review*—Denman, Burton, and Dr. Edward Smith—Wine, simply a rather Strong Grog—*Times*—Druitt—Thudichum, &c.

6. *Vinous Adulteration,* 50

Testimony of *Times, Saturday Review,* Druitt, Denman, &c.—Creation of Wine *ex nihilo*—Continuous and Expanding—"Brewers' Chemists"—"Sugar-Infusion Wines"—Not without their Defenders—Condemned by General and Medical Press—Wine-making brought to a *reductio ad absurdum*—Relative Potency of Wines.

PAGE

7. *Adulteration—continued*, ... 61

Daily Telegraph Commission—M. de Colleville—Captain Kennedy—Rev. Dr. Holbrook—Dr. Parkes—*Encyclopædia Britannica*—Deleterious Ingredients of Wine and Spirits, long list of—Dr. Richardson's Exposures in Cantor Lecture V.—Reid's *Temperance Cyclopædia*—Moral.

CHAPTER III.

Earlier Investigations.

1. *Opening Quarter of the Century*, ... 85

Drs. Fyfe and Prout of Aberdeen—Dr. Rush of Philadelphia—Dr. Kirk of Greenock—Dr. Ogston of Aberdeen.

2. *Alexis St. Martin and his Perforated Stomach*, . . . 88

Gunshot Wound—Dr. Beaumont—His Book—His Experiments—Value of his Results.

3. *Dr. Percy's Experiments*, ... 91

His Prize Essay—His Important Discoveries—Settled the Question whether Alcohol acted by Nerve Sympathy or by Absorption—Sir Robert Christison—Dr. Taylor.

4. *The Advanced Truths Maintained*, ... 95

Dr. Grindrod's Prize Essay—Professor Carpenter's Prize Essay—Professor Miller's "Alcohol"—Young Teetotalism—Dr. F. R. Lees—Interval between Percy and Perrin—Medical Neglect—Temperance Advocacy.

5. *Liebig and the Chemical Period*, ... 100

Percy Overshadowed by Liebig—The Liebigian Theory—Twofold Division of Food—Alcohol no Flesh-Former—Not even Proved to be a Heat-Former—Even if so, Bad—Professor Pettenkoffer—Liebig's Admissions—His Assumptions Void of Proof—His Abettors.

PAGE

6. *Protest of Temperance Physiologists,* 107

Their Defensive Position—Discussion between Doctors Browne and Lees—Dr. Lees' Position in 1843—Resemble best Views now—*Westminster Review*—Dr. Carpenter.

CHAPTER IV.

The Parisian Experiments of 1860.

1. *The Parisian Experiments Expounded in the* Westminster Review, ... 118

Amende Honorable—Dr. Carpenter's Exposition—Occasion of Experiments—Chromic Test—Remarkable Results—Elimination.

2. *Subsequent Investigation and Discussion over the Parisian Results* of 1860—*Elimination Question continued,* . 129

Baudot—Trousseau—*British Medical Journal*—Dr. Edward Smith—Drs. Parkes and Anstie—Lessens Vital Heat—Dr. B. W. Richardson.

CHAPTER V

Is Alcohol in any Sense a Food.

1. *What the Parisian Results Indicate on this Question,* . 139

Alcohol no more a Food than Anæsthetics are, says Dr. Carpenter—"Elective Affinity"—Alcohol and Anæsthetics in the same Category.

2. *What Constitutes a Food?* 144

A Prime Question—Beclard's Reply—Dr. Anstie's Objec-

PAGE

tion—Alcohol not Admissible within the Food Definition under the Wing of Water, Iron, and Salt—Definition Run Mad—Professor Beale—Dr. Todd—Dr. Ringer—On Vexed Question of Alcoholic Action, Dr. R. would distrust Physiology, and "Rely solely on Experience"—Medical Testimonies against Alcohol as a Food—Publicans Self-styled "Dispensers of Alcoholic Food!"—*British Medical Journal.*

3. *Water, the True and All-Sufficing Beverage of Man,* . 158

If so, then Alcohol no Beverage, for it robs the Tissues of Needed Moisture—Dr. Cheyne—Dr. Wilson—Professor Hoffman—Youmans—Gough.

CHAPTER VI.

Does Alcohol Arrest Waste, and thereby Economise Food?

1. *What if it did? And at what Cost?* 167

Boissons d'Epargne—Moleschott—Dr. T. K. Chambers—Dr. Lees—Dr. Hammond—Is Arrest of Waste an Advantage?—Professor Carpenter.

2. *Monumental Specimens,* 174

Plethora—Explanation—Daniel Lambert—Sots—*Vis Medicatrix*—London Draymen—Big Ben—Buckinghamshire Giant—Feline Sample.

3. *The Leicester Pamphlet,* 183

Built on Liebig—Contemporaneous with Parisian Results that Overthrew Liebig—Spares not Teetotalism—Would Save Food by Beer—Frankfort Congress—Professor Donders—Ravages of Water—Dr. Parkes—Dr. Jewett.

CHAPTER VII.

Is Alcohol a Stimulant?

PAGE

1. *Dr. Anstie's Definitions and Views on this Point,* . . 194

Last Stronghold—Dr. Simon—Anstie's Demarcations—His Medicinal Doses—His Cautions.

2. *Other Authorities,* 198

Dr. T. King Chambers—Dr. Edmunds—Dr. Lees—Billing—Brinton—Parkes—Maudsley—Paterson, &c.

CHAPTER VIII.

Is Alcohol a Poison?

1. *What Constitutes a Poison?* 206

The word "Intoxication"—Its own best Explanation—French Usage—"The Excess is Poison," say some—Dr. Anstie—Poison Defined—Classification.

2. *Testimonies of Scientific Men that Alcohol is a Poison,* . 210

Sir Robert Christison—Orfila—Professor Miller—Dr. A. C. Lees—Dr. Gordon—Sir Astley Cooper—Dr. Ure.

3. *Poisonous Action of Alcohol,* 212

Courten—Percy—Pereira—Professor Miller—Principle of Operation—"Elective Affinity"—Examples of Poisonous Local Action—Affinity of Alcohol for the Brain.

4. *Slow Poisoning by Alcohol,* 215

Folly of the Tippling and Soaking Sot—Dr Guy—Pandora Outdone—Nature's Testimony—The Bradford Accident.

5. *An Illustration or Two,* 218

A Domestic Illustration—A Passing Moral—Professor Miller's "Bull in a China Shop"—Its Galloway Fulfilment.

CHAPTER IX.

THE FORCE-GENERATING PRETENSIONS OF ALCOHOL TESTED BY EXPERIENCE.

PAGE

1. *Science and Experience*, ... 224

Popular Fallacy—Condemned by Science—Liebig—Carpenter—Appeal to Experience.

2. *What Alcohol can do for us under Bodily Exertion*, . . 225

Scourges us out of our Reserve Force—Sir Benjamin Brodie—Professor Parkes—Professor Carpenter—Pump Case—Boulton and Watt's Men—Benjamin Franklin—George Easton—Western Railway.

3. *Athletic Training and Effort*, ... 232

Regimen — Harrison's "Athletic Training" — Condemns "Fermented Liquors of every kind"—Ancient Germans—Ancient Athletes—Angus Cameron—Webb—Weston.

4. *Travelling*, ... 241

Travellers Practical Athletes—Bruce—Livingstone—Backhouse—Waterton—Smollett.

5. *Hardships of War*, ... 242

Great American War—Generals Howard, Stewart, Stonewall Jackson, &c.—General Cass—Lord Cornwallis—Cases named by Dr. Parkes—Dr. Mann—Sir John Hall and Kaffir War—New Zealand War.

6. *The Red River Expedition*, ... 247

Captain Huyshe's Narrative—March, 1,200 Miles—Rapids, "Portages," and other difficulties—None Sick, "no Time to be Sick"—No Spirit Ration—All done on Strength of Food, Coffee, and Tea—Relished by the Men—"Fifty Times as good as Brandy, Rum, and Whisky"—Expedition Entirely Successful—Colonel (Sir Garnet) Wolseley's Testimony.

PAGE

7. *The Ashantee Expedition*, ... 253

Same Commander—No Rum on March—Dutch Expedition—"Rattlesnake"—Professor Parkes' Report—Dr. Troup—Surgeon-Major Wiles—42nd Regiment—Dr. Parkes' Conclusion.

8. *A Passing Word for the Public Service*, ... 262

Ship "Victory"—Value of our Soldiers and Sailors—Their besetment—"A Doctor's Log"—True Army Reform—Perils at Port—Misses Robinson and Weston—Mr. Gregson—Mr. Edward Baines—Abstaining Soldiers and Seamen—Surgeon-General Maclean—Cromwell—Havelock—Dr. Parkes' Testimony against Spirit Rations.

9. *What Alcohol can do for us under great Heat*, ... 271

Cases adduced by Professor Carpenter and Parkes—84th Regiment—Martin—Jackson—Havelock—Sir Richard Dacres—Sir W. F. Williams.

10. *Under Extreme Cold—Arctic Expeditions*, ... 274

A Snow Case—Thomas Edward—Dr. Parkes—Earlier Arctic Expeditions—Scoresby—Dr. Carpenter's Personal Experience—John M'Intosh—Sir John Richardson—Esquimaux and Canadians—Dr. Hooker—Arctic Authorities *versus* Liebig—Hudson's Bay Company—Dr. Kane—Dr. Morton—Lady Franklin—Captain Kennedy—Goodsir—These and other Cases by Dr. Carpenter—Parry—Dr. S. E. M'Kinley—"Madam *Vis Medicatrix Naturæ*."

11. *Recent Arctic Expedition*, ... 295

Scurvy—Dr. Edmunds—Dr. Rae—The Abstaining Members of the Crew—Ayles, Champion Sledger—Lime-Juice displaced by Rum—Sir Alexander Armstrong—Surgeon Colan.

12. *Under Mental Exertion*, ... 311

Delusive Flashes—Lord Palmerston—Dr. Yeo—Byron—Harriet Martineau—*Contemporary Review*—A Physician's Testimony.

CONCLUSION, ... 314

TEMPERANCE PHYSIOLOGY.

CHAPTER I.

INTRODUCTION.

1. *Popular Ignorance of Physiology, and How it is to be Dispelled.*

THE evils consequent on physiological ignorance are patent on every hand. Without referring to the degraded drunkard whom tyrannic appetite has rendered reckless, and who, in fulfilment of the adage, "He rides hard whom the devil drives," lives in habitual and defiant revolt against the laws of his own being, a glance at the homes and habits of too many of our people will show at what awkward angles they are constantly putting themselves in relation to organic law, without in the least suspecting what they are about. Where beer and wine delusions prevail, and have long entrenched themselves behind the inveterate and vicious habitudes of diet, trade, mart, and hospitable board, the evil is mightily intensified; and, being veiled under the garb of respectable usage, it becomes greatly more intractable. In these ways, especially when strong drink is habitually used under such specious misnomers as "support,"

"nourishment," and "cordials," many conscientious and confiding people are daily committing tragic follies through downright ignorance of the laws which regulate bodily health.

Now the people, meaning thereby the industrial classes, have, of all sections of the community, the best right to know the laws of their organic being; for besides that they constitute the base of the social pyramid,—the muscle and thews and sinews of the body-politic,—they are the class that are the most called on to exercise their own bodies, and that can least afford the time and expense needed to lay them up in the dry dock for repair.

Who then are the parties to expound to the people the organic laws? Do you answer, doctors? So do we. Doctors pre-eminently are the proper physiological instructors of the people; and so, to a noble and increasing extent, not a few of them are, comprising names that rank confessedly among the foremost in the profession. But if we consider the amount of learning and talent, and the prodigious numbers embarked in the medical profession; and, yet more, if we consider the crying need for popular enlightenment on such themes, such cases are comparatively rare. And in the nature of things it can hardly otherwise be. The medical profession is a very laborious one, and, from the imperious calls to which it is subject at all hours, it is one by no means favourable to extra duties either by voice or pen. The men whose skill and experience best fit them to instruct

us in the laws of health, are just the men whose eminence and success leave them least time to do so—except in the comparatively few instances in which success floats them into the learned leisure of professional chairs, or into timely retirement. Meanwhile, the need of the people is great. Physiologically speaking, many of them are "perishing for lack of knowledge." Even one lecture a year from our medical practitioners, locally arranged and duly distributed—certainly no great tax—would be an immense boon. From the laws of our organism outward through all our material relationships, and moral implications as well, such qualified instructors could illumine whole spheres of action and habitude that are to many enveloped in gloom. House accommodation, diet, clothing, trade perils, sanitary arrangements, and the like, may suffice to indicate the boundless field in which medical men might expatiate at will without risk of ever exhausting it, and with the pleasing consciousness that their every step was in the walks of practical philanthropy.

Such are the lines on which, to name a conspicuous example, Dr. Richardson is at present working to rare and admirable purpose. Myriads of the population are drinking in his teachings, and are ready to welcome similar light on every hand. While too many violate the laws of their organism from vitiated appetite and perverse will, there remain countless multitudes more of whom, in these respects, we must own that "evil is wrought by want of thought as well

as by want of heart." Over such, in all strata of society, medical men have an influence the potency of which they themselves often fail to appreciate. The men to whom we confidingly trust our bodies under the conscious helplessness of disease, can hardly exaggerate the influence they possess and wield. Were they only to give a portion of this to guide the people to the better fulfilment of the maxim, "Prevention better than cure," the good they would do would be immense.

Many years ago, when living in the north of England, I received much benefit from a series of lectures delivered by Dr. Grindrod, the author of the well-known prize essay entitled *Bacchus;* and I well remember how much, in private as well as in public, he urged the importance of popular lectures to instruct the people in the laws of health.

The same principle points to a yet more fundamental and effective method for promoting this end, and which, if only fully and fairly worked, might in due time bring about a moral and social revolution—namely, the introduction into our school-books of lessons on physiology, with emphatic reference to alcohol and the drink delusions of the day. This would be a sweetening of the poisoned fountains that could not fail to foreclose or displace many "a stream of cursing and bitterness" by pure and salubrious issues. It is long since the idea commended itself to some leading temperance reformers; and it is gratifying to find that in these school-board days,

and in the hands of enterprising and right-minded publishers (such as the Messrs. Collins of Glasgow), it is now in course of being zealously carried into effect.

In promotion of the same end, every available agency of the requisite degree of intelligence should be encouraged and welcomed. Ministers of the gospel, in particular, might do much in this line of usefulness, not only to such extent as might be suitable in their stated ministrations, but in Bible and other classes among the young of the flock, by occasional lectures, and by contributions from their pen. Every man, as well as every minister, is a centre of influence; and there is only too urgent need for each to do what he can.

It is on this principle alone that I have, in the present little volume, adventured into a field at whose entrance I expose myself to the risk of being derisively warned off in name of the ancient maxim, "Let the cobbler stick to his last." My one plea is, I speak not as one who has authority, but merely as one of the scribes, who (with a better intent, it is hoped, than some of the ancient scribes) seek to break and to distribute among the multitude portions of the physiological bread which medical authorities have provided for us, that it may find its way to those who need it most.* With this purely practical aim, I shall do my

* Not but what I might plead some small study in that line, having, a good many years ago, from a deep interest in these subjects, imposed on myself attendance at the various classes embraced in the first half of a medical curriculum,

best to avoid technicalities, and use great plainness of speech. The question before us narrows itself very much into that which concerns us and ours daily—the question of food, health, strength, and dutiful activity. It is one alike of personal interest and of public philanthropy. If "a merciful man regardeth the life of his beast," a wise man will be merciful to his organism—that "vessel" or implement of the soul which we are bound to "preserve in sanctification and honour." In immediate connection with this it is said, "that every one of you should know *how*." It is a thing for us to study and make clear to our own intelligence; and when we have come to know it, "happy are we if we do it," and happy, also, if we get others thus to know and to do.

2. *Fundamental Principles.*

Much of new and strange is propounded in these days under the name of Evolution. This is the pet theory of the period—the fashion, the passion, the almost rage of the day. We have nothing to say against it, in so far as it can make itself good; but we decline to mount that hippogriffe, and be borne by it beyond true science into the wilds of cosmic theory, where we

including the due amount of dissection. But what knowledge I then acquired, and what I could since see in two of my sons who are in that profession, have mainly sufficed to impress me with my own ignorance, and with the immensity of details comprehended in a proper acquisition of medical science.

are apt, in the long run, to find ourselves *minus* all religion, natural and revealed.

Among the fundamental questions it has stirred anew is that of materialism. This tenet, somewhat modified, is very prominent in these days. Its foremost champions—such men as Herbert Spencer, Huxley, Haeckel, Bain—would make substance one, without distinction into mind and matter, except as different sides of the same thing; or, if they must designate it by one of these names, they would prefer to call it matter, which Tyndall affirms to have in it "the promise and the potency of all life." In this way the primordial molecule—though, in the pithy phrase of Sir John Herschell, itself clearly "a manufactured article"—is made out to be creator and creature in one; and to make way for it the Divinity is banished out of his own universe into the region of the "absolutely inscrutable." Onward and downward from cosmic vapour, through molten fluid to crust-covered globe, in due time swathed in its garment of ocean, the process is traced till, at some undefined moment, the first life-sparkle is evolved, which thenceforward grows and expands to a Luther's will or a Shakespeare's brain. How the advanced brute first got itself erect on two feet, and sublimed its bray into logical language—say, the inimitable Greek—and refined its fears into virtues, and its cautions and expediencies into a constituted system of utilitarian morals, behold, does it not stand written in the *Descent of Man?* And yet the theory, in that

wholesale form, is utterly and absolutely without proof. Zoology says, It is not in me; for no such transmutation is seen, and there are breaks in its orders which no science can bridge. Geology says, It is not in me; for, notwithstanding the paraded hipparion and some other items, its records are utterly silent, and its successive stages of development are irreconcileable with the theory. History and chronology say, It is not in me; for though chronology is an exhaustless bank, the theory draws upon it unwarrantably by mere paper scrip multiplied at will, with nothing solid behind. And chemistry says, It is not in me; for in no instance has it ever been known to develop life except from antecedent life, nor does it present the least analogy on which to ground the conjecture that at some unknown moment in the far past, the subtle forces of matter evolved the first vital spark which has since developed the entire life, intelligence, and spirituality to be found on our globe.

We hold, then, by the old fashioned distinction between mind and matter; and therein we hold the charter of all our faith and hope. Without entering into the question, which is not our present business, it may suffice to observe that our proof of mind is more immediate and direct than our proof of matter. Both are primary, intuitive, inextinguishable beliefs; but by the open door of consciousness we enter immediately into our own inner world of mind; and next, consciousness, through sense, and also through reason, reveals to us an outside world, both of matter and of

mind. If we seek to know what is matter and what is mind, the first thing that strikes us is their entire distinctness, so far as we are able to discern. By the door of consciousness we enter the realm of mind, to ascertain if we can find anything there in common with matter, or any point which we can call the borderland between. But our search is vain. Wander where we may throughout those inner chambers of the soul, nothing can we find but thought, judgment, imagination, affection, choice, and the like, which present nothing but contrariety to all we know about matter. Making the attempt from the outside, we enter by the door of sense on the exploration of our own material organism, to see if we can arrive in this way at any meeting point between body and soul. We know instinctively that if any such thing there be, it must be looked for in the nerves and brain. But turn our scalpel where we may, what find we there but the same albuminous elements that we find elsewhere in the body, fed by the same vital fluid, and in a form the simplest, softest, and most perishable of all. The very eye, what more can we make of it than a mere optical instrument, the structure of which will maintain itself as a piece of inert matter, as the rest of the organism will do, for some time, more or less, after the indwelling life has gone. It is as if by a mysterious and invisible door we entered an enchanted mansion to find ourselves, turn where we may, in an interior fairy-world, where all finest lights and fairest forms were flitting about in the endless dance of

incessant life and action; but when, returning to the outside, we set ourselves to survey it with the eye of mere external sense, and proceeded to enter it by any of the doors and windows which sense could penetrate, in order to find our way anew into that fairy-realm within, we then discovered that though we went from corridor to corridor, from gallery to gallery, it was but dead, dull, empty chambers, with their walls and ceilings, that we could see, in endless complexity, and with labyrinthine passages, wondrous indeed, and admirable withal, but without one vision of life and beauty to welcome and gladden us, let us direct our exploration whithersoever we may.

To us the conclusion is inevitable. We find in our being matter and mind in harmonious combination, but distinct and unblended. As minds, we are conscious of life, motion, action, power; our material part, so far as we can feel or discern, acting only as it is acted on and impelled. In the outside world we see, in like manner, so far as experience and analogy conduct us, that matter is inert, that it moves only in so far as it is moved by life-power, and that beings constituted like ourselves act similarly to ourselves, and move their limbs and their bodies under the soul-power within. From this mysterious but consciously known principle of mind, we rise to the conception of the Infinite Mind and Omnipotent First Cause; nor can we stop short of this indestructible faith and hope of humanity without browbeating our reason and belying our very consciousness.

"What am I? Whence came I? Whither am I bound?" were three questions which an ancient sage is said to have put to himself daily, to fan and ennoble his ardour in duty. "What is your life?" is a briefer and profounder form of the same high question. If we turn to the forms and manifestations of life around us, they meet us on every hand. The world quivers with life all over. Earth, air, and ocean teem with it. Every leaf is an inhabited continent; every water globule is a little ocean world of sentient existence. Nature stirs, and rustles, and heaves like a great life-garment of the Almighty, embroidered with every form and dye of organised being. The simplest vegetable form can scarcely be distinguished from the mineral; the simplest animal can scarcely be distinguished from the vegetable. And through what wondrous gradations does life rise and crown itself in man. We are lost and bewildered beyond relief, until we turn to Him "who lives through all life, and operates unspent."

For if we turn from the forms of life to its principle, all is mystery. Sense cannot tell, for sense can see no deeper into life than its forms. Science cannot tell, for the same reason. The anatomist's knife has no edge to lay bare the life-principle. The physiologist can tell us much of organ and function, but the principle of life is beyond his ken. He and the naturalist will tell you that life is the resultant and the sum of organic functions and changes; but this is no definition of the life-principle at all. The metaphysician may tell us, as some do, that life is an

outwelling energy that runs into material forms, like water to its level, or like melted metal into its moulds, and will, according to conditions, evolve a plant here and an animal there; but this is to tell us nothing of more consistency than mere fancy or theory, and therefore nothing to our present purpose. In fact, philosophy is here helpless. Never did sage plunge deeper among the mysteries of life than Plato. With what result? In a little epigram of two lines, almost his only poetical relic, he pictures the soul seeking to scan the mysteries of the starry heavens, unconscious of the deeper mysteries of life wrapt up in itself; and therefore, introverting his view, he invokes each star, as a little eye, to help him to pierce the mystery of his own being:—

"Thou gazest on the stars, my life, ah, would that I might be
Yon starry skies, with thousand eyes, that I might gaze on thee."

The only solution of the life-problem possible to highest reason, is that which sage and child must alike come to as taught by revelation. God, the ever-living, is the life of all living. "We are all his offspring." "In Him we live, and move, and have our being."

3. *Man's Place and Responsibility.*

Thus man is a complex unity. In his personality, or nobler part, he is a spirit, communing with spirit; in his material part he is of the earth, chained by

gravitation to the earth, fed from the earth, and doomed to return to the earth. He is thus under law both to the world of mind and the world of matter; and soul and body, though distinct, being mysteriously inter-related in a composite unity, even to the extent of persistent personal identity, if we break either set of laws we incur penalty in our whole nature. To disobey in either case is to run our heads against the eternal adamant, to rush on the thick bosses of God's buckler of benign and protective law, and get self-caught in the cogs and toothed wheels of divinely constructed machinery, which, if we will not bend to it, will assuredly not bend to us, but whirl us into the vortices of irremediable ruin.

Man, as an intelligent being, can, to the due extent, acquaint himself with the laws of his complex nature. Consciousness opens to him the infinite world of mind and the finite world of sense. To both spheres he belongs, and both spheres he surveys. And as he turns in upon himself, and finds himself so much out of joint with each of these relationships, he exclaims with the sage, "Dust and deity!" or with the poet—

> "How poor, how rich—how abject, how august,—
> How complicate, how wonderful is man!
> How passing wonder He who made him such,
> Who centred in his make such strong extremes.
> Dim miniature of greatness absolute,
> An heir of glory, a frail child of dust:
> Helpless immortal! insect infinite!
> A worm! a god! I tremble at myself,
> And in myself am lost!"

As intelligent we are also moral creatures, and as such have a free self-active part to perform in all that pertains both to the means and to the ends of life, for all well-being and for all well-doing. If we act this part wisely and faithfully, happy are we; if otherwise, woe betide us! and our blood will be on our own heads! For in the matter of health and development much is left to ourselves. With reason for our light, and with conscience for our king, and with God's grace for our help, we are to go up and possess our God-given lands of promise, both in the world of matter and in the world of mind. And as we ascertain and habitually obey the laws of our being, we not only protect but expand and ennoble our entire nature. We are conscious of the dignity of free-will endowed beings, whose health, happiness, and destiny are, so far, in our own hands. We know and feel that body and mind, though united, are not interblended, not fused into some *tertium quid* different from either. In this union, therefore, the spiritual part is supreme. With the Psalmist we call it our "glory," or nobler part, and our "darling," or dearer part. The soul, in fact, is our proper self; and the body is but its vessel. As with hands, feet, or other members in detail, so with the entire organism, we, from the lordly domain of the spirit, call it *ours*, not *us*. As Dr. Arbuthnot well put it more than a hundred and fifty years ago—

"Am I but what I seem, mere flesh and blood?
A branching channel, with a mazy flood?

The purple stream that through my vessels glides,
Dull and unconscious flows, like common tides;
The pipes through which the circling juices stray,
Are not that thinking I, no more than they;
This frame, compacted with transcendent skill
Of moving joints obedient to my will,
Nursed from the fruitful glebe, like yonder tree,
Waxes and wastes: I call it MINE, not ME."

To employ a simple illustration, few things are more graceful than a fine prancing steed thoroughly controlled by its rider. Speed and impetuous force combine in its every movement with safety, freedom, and grace. The animal himself evinces the maximum of confidence, and something like a sense that he is in his best style and at his highest mark. But let the rider get timid and shaky, and hold the curb with a slack or inconstant hand, till the steed bounds off, over-ruling its rider without ruling itself, the result is anarchy and terror, which may be the destruction of both. By the steed understand the body, and by the rider the soul, and the illustration will read its own riddle, and point its own moral.

All this will show how imperative it is that our intelligence should understand, and our reason rule. It is important that we should realise man's true position of dignity and dominion, as, in Bacon's words, "nature's interpreter and high-priest," and also her delegated lord, to subjugate her to his highest ends, and ennoble himself in the very act. In this great mission reason and conscience are at once his rule

and his crown. Unlike other animals, his infancy is helplessness itself. Why? Because there is reason in the parents to see to this, and social affections and relations to be thereby nurtured and developed. Man is provided by nature with no clothing. Why? Because, like a wise and kind matron, she sends her son to ply those arts by which he can at once clothe his body and enrich and elevate his mind—not to mention the fact, that he can thereby best accommodate his clothing to his climate, as he ranges the earth, which he is meant to do, and does—from the torrid line to the icy pole. He is not guided by mere instinct to food there and then laid to his hand, to be eaten as he finds it. Why? That he may exercise his reason in the needful arts of selection and preparation; and while thus fitting himself for choosing the good and refusing the evil, he advances himself all the while in science and practical wisdom. In a word, man has not the muscles of the horse, nor the elasticity of the stag. Why? We might reply, because in the human hand, and opposable thumb, and upright stature, and other things of the kind, he has physical advantages far superior. That is true; but the principal and the proper reply is, because man has *reason* and *will*, and his high mission is not merely to multiply and replenish the earth, but to subdue it, to subjugate it, and shape it to his own lordly ends; not to equal those animals in strength and speed, but to claim by right divine them and their attributes as his; to make the deep crouch beneath him like a beast of

burden, to bear his merchandise to distant climes; to imprint on the earth ever increasing memorials of his material and moral triumphs; to twist the lightning into his telegraphic messenger; to compress vapour into a power which far outdoes that of the stateliest organism—by which chariots can be made to run without horses, by which ships can be made to sail against the wind. For all these ends the wise Creator has endowed man with an organization which combines strength with convenience, and delicate sensibility with majesty and beauty.

The application of these general principles to our special subject will be obvious at a glance. Man's reason is left to judge of alcohol by its nature and effects, as of all other things. If he neglects to do so, or goes in the face of his reason, we may indeed wonder at his criminal folly, but we need not wonder at the results. These are inevitable, and wisely and righteously inevitable; for surely it is far better that such results should follow, than that vice should be rewarded, or human reason dethroned.

Thus the physiology of total abstinence is vitally related to its morality. Both belong to the fundamentals of the question; and what God and nature have conjoined, let not man put asunder. The Author of our moral laws is the Author no less of our organic laws. What science experimentally demonstrates to be a poison, morality authoritatively forbids us to label as food. The permanent properties of such an article, and its invariably pernicious or deadly effects

when introduced into the human system, are God's continued voice in nature declaring it to be a poison. "Thou shalt not kill," is God's voice in the Decalogue, and in the conscience as well, sternly commanding us to abstain from that article as food.

No question connected with the chemistry and physiology of dietetics can for a moment compare, in magnitude and importance, with that relating to the action of alcohol on the human system. No one will hesitate to admit this, who reflects for a moment on the oceans of alcoholic fluid, in various forms and degrees of potency, which daily flow down infatuated throats—from that of the peer to that of the pauper—under the deceptive label of wholesome and nutritious beverages. Every one of these liquids is a lair for the self-same evil spirit. The inspiring presence of alcohol is their common characteristic. They are all dilutions of that substance, in different degrees, and with diversifying accompaniments. These last-named differentials are wholly immaterial. The proper designation of all these beverages is alcoholic dilutions. "Strong waters"—allowing for different degrees of strength—denotes their nature pretty accurately; for they consist of water, pure or muddy, mixed with alcohol; and the presence of this sharp alcoholic ingredient is the one passport that gains them admission into millions of willing mouths. If this chemical substance, then, called alcohol, should turn out to be not only wholly innutritious, but rankly poisonous, the so-called "refreshing beverages" are at once

stripped of all title both to the noun and the adjective. Instead of "beverages," they are mere chemical fluids; and instead of "refreshing," they are precisely the reverse, for they are simply liquid poisons, in varying degrees of dilution. If our moderate drinkers are here under a delusion, it must, considering its prevalence, be a very pernicious one. If, on such a point, "the light that is in them be darkness, how great is that darkness?" It is a matter of daily concernment. The case is all the worse that it is one of perverted habituation. Daily indulgence, under specious and fallacious associations, is steadily transforming many lives, under the law of habit, out of the natural into the artificial—out of an element of health, and harmony, and comfort, into a precisely opposite condition, where every fibre of the empoisoned system craves anarchy for its law, and cries out, in its desperation, "Evil, be thou my good!" How infinitely desirable, then, that the scientific truth on this most vital and practical point should, first of all, be satisfactorily determined! and then, as Shakespeare says, that it be put "into the thunder's mouth," and made to ring through Drinkdom, till the ear of every tippler, moderate and immoderate, be made to tingle, and every drinking den echoes the warning sound.

4. *General View of the Material World, and of its Relations to the Human Organism.*

Vitally related as we are to the material world, it is a question of direct personal interest to us all, Of what

elements are we and the surrounding material world composed, and on what principles are our material organisms sustained? For an answer to this we must interrogate science, and there are three sciences in particular that are ready to reply—namely, chemistry, the science of elements and properties; anatomy, the science of structures and organs; and physiology, the science of life and function. These, of course, extend their light forward into all departments of medical study and the healing art.

Chemistry first comes to our aid, to tell us our place in the material system. Of what, we first ask, is the human system composed? Of earth, water, air, and fire, replied the ancients in their scientific childhood. Equally childish was the aim of the mediæval alchemists to discover the panacea, or universal remedy, the elixir vitæ, or secret of life, and the philosopher's stone for transmuting the baser metals into gold. But stupid and abortive as these attempts were, their earnest industry found its reward in the incidental result of not a few important chemical discoveries. The base material was really turned into gold, but in the sense in which the farmer in the fable found the treasure hid in his field, and in which many an Australian immigrant finds gold at this hour—not in a way to supersede patient toil, but to call it forth as the true avenue of happiness to man.

Those accidental chemical discoveries have ripened, in modern science, into triumphs the most extraordinary, in which the four elements of the ancients

are swallowed up in a profound analysis that merges them all. This analysis has determined that the whole earth, with its ocean and enveloping atmosphere, with all its varieties of metals and minerals, and with all its wondrous living organisms, vegetable and animal, so far as patent to man, is made up of some sixty-three elements, the number of which might be increased by new discoveries, or perhaps reduced, if our means of analysis could be sufficiently extended. Of these elements fully four-fifths are metals. But few as they are altogether, a large number of them are of very rare occurrence. Practically, the mass of surrounding nature is composed of but very few elements. The air consists only of oxygen and nitrogen, with a small infusion of carbon; water consists only of oxygen and hydrogen, the marine ingredient it holds in solution being mostly sodium and chlorine, which constitute common salt; our great marble, chalk, and limestone beds consist of carbon, calcium, and oxygen, or carbonate of lime; and other things exhibit corresponding forms and combinations. In the inorganic kingdom by far the most abundant and important element is oxygen; in the organic kingdom, the predominating element is carbon.

There is a regular gradation in being. The inorganic precedes and paves the way for the vegetable kingdom, and both for the animal; but where the one ends and the other begins, it is often impossible to say. All organic life draws its nourishment from the earth and the air. Plants are nourished by the

root and the leaf. Their aliment is of two kinds,—azote, chiefly in the form of ammonia, and carbon. The azote, or ammonia, is taken up by the root, or rather by the spongioles, which correspond to the lacteals and absorbents in animals, and which must be carefully removed in transplantation. The carbon, after being separated from the carbonic acid in the air, the oxygen being set free, is inhaled by the leaf, the lungs of the plant, which presents an expanded surface of veins, air passages, and pores. This process takes place during the day, and particularly in sunshine. Animals, as they rise in the scale, have a more and more complicated apparatus of nourishment; one remarkable difference between them and plants being, that whereas plants inhale carbon and give out oxygen, animals inhale oxygen and give out carbon. Of the sixty-two or sixty-three chemical elements, only eighteen enter into the composition of organic structures—some of these very rarely, and many of them in but small proportion. By far the most important are these four, which are termed cardinal elements—viz., carbon, hydrogen, oxygen, and nitrogen—the rest being earthy salts and metals, such as phosphorus, sulphur, chlorine, iron, and a few more.

In the highest division of the animal kingdom—the vertebrate—and the highest genus in that division, stands man, between whom, however, and other vertebrates there is a much closer structural resemblance than we are at first sight apt to imagine. In food, function, and parallel organs, the differences are

more circumstantial than real. The great organic principles that apply to the one class apply also to the other; and hence, from the instinctive habits of the lower animals, rational man might deduce many lessons of practical wisdom.

If in rare cases even animals can be brought to take as food or drink what is bad for them, it is generally by hard pressure and constraint. What can the stalled ox do but eat the brewer's refuse that is set before him, and become a monster of fat. What could a certain favourite cat (whose memorial found its way, a few years ago, into the public prints), which had got into the hands of alcoholising doctors, do but take their wine doses, grow fat, and sleep, and droop, and die? In other cases animals are snared by their strong imitative instincts. Monkeys, of course, do odd things in this way. They are not all as wise as one was in America, whose master snared it once into drunken indulgence, but could never do it again; who, to escape the renewed snare, took refuge on the house roof, and, on a gun being pointed at him, slipped to the other side, and on being pointed at him on that side, returned to the former position, and on a gun being pointed at him from both sides at once, sprang to the chimney top and hung down the vent from his hands. These imitative creatures can at times take on the luxurious vices of human civilisation. They can be got not only to indulge in tea and coffee, which is imaginable enough, but even in spirituous liquors. Once snared *to* drink like human dupes,

they can, like them, be snared *by* drink. "Brehm asserts," says Darwin, "that the natives of north-eastern Africa catch the wild baboons by exposing vessels with strong beer, by which they are made drunk;" and very comical is the account he gives of their saltations and grimaces, succeeded, of course, next morning by the inevitable dismals, when they repel the cup, but relish lemon juice. They will even take the pipe into their cheek, as Darwin himself has seen, and smoke the detestable weed with apparent relish.* Dr. Richardson says (in *Popular Science Review*, April, 1872), "I knew some young people who gradually taught a favourite kitten to walk round the dinner table during dessert, and taste wine. It was not long before the taste became a luxurious habit with the animal, but she soon began to fail under it. She slept half her life, lost all desire for play, and in the course of a month or two was dropsical and beyond cure. She contracted the liver disease called cirrhosis, and a very perfect specimen of the disorder she presented after her untimely death. I have observed that birds can be made to acquire a taste for alcohol. Pigeons and fowls, after a little training, will pick up peas saturated with spirit, and subsist on such diet. The animals fatten and sleep, but they lose their vivacity, and certainly lose their muscular power. The same rule holds good with fish. These animals, under the feeble but steady influence

* *Descent of Man*, pp. 10-14.

of alcohol, become indolent and sleepy, and soon die." These, however, are exceptions that only prove the rule. Left to their own native instincts they will have none of these luxurious poisons. It is for man, at the apex of rationality, to perform this last feat of folly.

CHAPTER II.

Alcohol and the Drinks.

1. *Chemical Composition, Character, and Genesis.*

It may be well at this stage to make some nearer acquaintance with alcohol. Presenting himself, as he does, under the character of benefactor-general to our much suffering race, under all circumstances and conditions, "in joyances and high tides, in weeping and in woe," it becomes us to take his measure, to familiarise ourselves with his changes of apparel, which are as parti-coloured as the rainbow, to take note of his deeds, history, and character, to trace his pedigree, and, in brief, to analyse him from the centre to the skin. He is a slippery eel to handle, but modern chemistry has caught him, and given articulate account of him, and the long years of his invisible and inscrutable mystery have ended.

To begin with its most essential designation, Alcohol, having been discovered in Arabia, has an Arabian name, *al* being the article, as in Alcoran, which means the scripture, or Arabian bible. The derivation of the name alcohol is uncertain. It is usually and most probably derived from the Arabic *kahala*, equivalent to the Hebrew *cachal*, to *paint;* the word for a very fine powder being also applied to highly rectified spirits.

Dr. Edward Johnson, however, and after him Dr. Lees, prefer another, which one could almost like to be the true one, being so very appropriate—viz., *ghole* or *ghoul*, a name for evil spirits, with which Oriental superstition has peopled the earth, and which were supposed to assume different shapes, and enter the human body, and possess it, as it were, with a devil. The Arabian chemists, who first felt the inspiring power of the newly discovered agent, would, it is thought, very naturally exclaim, "Al ghole!" the evil spirit! This would bring the matter very nearly to where Shakespeare has brought it, when he makes one of his characters exclaim, "O thou invisible spirit of wine, if thou hast no name to be known by, let us call thee DEVIL;" and truly, what Milton says of Moloch may be said of alcohol—viz., that it is "the strongest and the fiercest spirit that fought 'gainst heaven." With all which compare the Turkish proverb, "There lurks a devil in every berry of the vine,"—a sentiment, of course, very exaggerated and extreme.

To turn now from the name to the thing, alcohol is nearly related to the ethers, and itself constitutes, with its derivatives, a very large family, whose members have strange features in common. Some of these—for example, methyl—are very useful in the arts. The alcohol of common use is that variety which bears the name of ethyl, more familiarly known as spirits of wine. Its intensely caustic taste is largely due to the property it possesses of rapidly abstracting water from every living tissue with which it comes in contact;

and if the fluids are albuminous, coagulation will ensue. "As a chemical agent," says Dr. Lees, "it absorbs the water from the living tissues, which resist by virtue of their vitality, and this re-action constitutes irritation, which, commencing with warmth and redness, may run through all the stages of inflammation." Its composition is as follows :—

Carbon,	52·67	per cent.
Hydrogen,	12·90	„
Oxygen	34·43	„

chemically expressed, its formula is C_2H_6O. In common with its alcoholic sisterhood, it may be considered as water in which one atom of hydrogen is replaced by a radical, whose formula is C_2H_5; so that ethyl alcohol under this view comes to be $\left.\begin{matrix}C_2H_5\\H\end{matrix}\right\}O$.

Exposed to oxidising agents it first parts with two atoms of hydrogen, and is converted into the new substance, C_2H_4O, known as ethyl aldehyde. If the oxidising process is prolonged by exposing diluted alcohol, mixed with ferment, to the air, more oxygen is absorbed, and the result is the production of acetic acid or vinegar, whose formula is $C_2H_4O_2$. Hence fermented liquors, containing yeasty elements, become sour on exposure to the air.

Ethyl, or common alcohol, is the product of the vinous fermentations of aqueous sugar solutions, under the action of yeast or ferment. The sugar in this process must be in the form known as grape sugar, and

the fermentation breaks it up into alcohol and carbonic acid. This is effected by what is called "catalytic," or breaking up action, because the ferment that sets it agoing does not itself enter into the composition of the new products. The change is simply into the two elements named, without any super-addition, and its principle is represented by the following formula :—

$$\underset{\text{Grape Sugar.}}{C_6H_{12}O_6} = \underset{\text{Alcohol.}}{2C_2H_6O} + \underset{\text{Carbonic Acid.}}{2CO_2}.$$

From this first process of fermentation, the original of all our strong drinks, the generated alcohol is next brought out naked, in the form of a dilute aqueous spirit, by the secondary process of distillation; and as it boils at a much lower temperature than water (at 78°·4), it is got in a more concentrated form by repeated rectifications. But it can never, by distillation alone, be entirely separated from water, of which, even in the strongest spirit, 10 per cent. still remains. But when distilled with some other substance, such as quicklime, which readily combines with water, it may be obtained pure, and in this state it is known as "absolute alcohol." This is a colourless fluid, of a not unpleasant odour, and a very caustic taste. Its specific gravity is considerably less than that of water. It has never been solidified, but at a temperature of - 100° it becomes viscid. As every one knows, it is highly inflammable, and burns with a dull blue flame. It has a powerful affinity for water, which it absorbs with great avidity, and interblends with it in all proportions,

evolving heat in the process, and causing the mixture to undergo contraction. Pure spirit, being much too strong to be used as drink, must be diluted by about a half, into what is known as "proof spirit," in the language of the Excise. Our strong liquors, in whatever form, spirituous or fermented, all agree in containing alcohol in various proportions, with sugar, extracts, and essential oils, to give them bouquet or flavour. Ardent spirits in ordinary use contain from 40 to 50 per cent. of alcohol, sometimes more, in which case they are spoken of as over-proof; and wines and other fermented drinks in smaller and varying degrees. The proportion of anhydrous alcohol—*i.e.*, waterless or absolute alcohol in wines—varies, says Dr. Parkes, from 6 to 25 per cent., though some deny that "the fermentation of the grape, when properly done, can yield more than 17 per cent.," all beyond that being due to the noble science of "fortification."

After this general description, let us now refer more particularly to the two connected processes of fermentation and distillation.

2. *Fermentation.*

"Nature," says a French writer, "never forms spirituous liquors; she rots the grape upon the branch, but it is art which converts the juice into wine."* Fermentation, of course, is a natural process, and one most important and benign; it is only art and man's device

* Chaptal: *L'Art de faire le Vin*, p. 2.

that prostitutes it to mischievous ends. The process goes on thus: let us take the vine. When the expressed juice of the grape is exposed to the air in a sufficient temperature, it is not long till increased turbidity and the rise of bubbles announce that fermentation has begun, and a few days may suffice to carry it to comparative completion. The process is, on all hands, freely admitted to be one of decomposition. Some nitrogenous substance, itself in a state of decay, must be present to start the process of fermentation, when it will go on, if not arrested, so long as saccharine elements and the requisite conditions remain. This initiating agent is that known as the yeast or ferment; it may be blood, old cheese, or any albuminous matter already in a state of change. Such a ferment exists in the gluten of the grape sugar; and hence the grape juice has only to be exposed to the atmosphere at a proper temperature, to begin spontaneously to ferment. In the production of other fermented liquors this ferment has to be artificially supplied or developed.

The philosophy of the case is simply this: many substances—for example gum, starch, or sugar, are not of themselves subject to decay; whereas others of similar composition, owing to the presence in them of albuminous, gelatinous, or mucous elements, are no sooner exposed to warm moist air than they begin to putrefy. These last, known as ferments, have only to be brought into contact with the former substances, to draw them into the same process, and keep it going under the due conditions, till the last fermentable

element is exhausted, and the putrescence comes to an end. It is the prevalence of these ferments in the organic kingdom that accounts for all vegetable and animal decay.

In the process of fermentation cane sugar must, and does, pass into the condition of grape sugar before alcohol can be generated. Starch has a very similar composition to sugar; and in the process of fermentation passes into grape sugar, and thence into alcohol. In this way the starch or gluten of the barley is transmuted into our fermented liquors. So also wheat, oats, rye, and even Indian corn—though barley answers the best. Starch is converted into grape sugar by adding a little sulphuric acid; and hence from potato starch is manufactured what is known in some of the northern countries of Europe as potato brandy. In short, the element in which alcohol is generated is that of decomposition, the very yeast presenting a beautiful array of germinal vegetable cells. In the process of growth the starch and gluten of the germ become saccharine, or sugary, in order to feed the new life; and as this takes place, like most other organic processes, in a condition of moist warmth, the brewer just imitates nature, by bruising and moistening the grain, and throwing it in this state, in the form of malt, on a floor in a dark room till, when sprouting has just commenced, he arrests the process by drying it in a kiln. He then bruises the malt, and throws it into his mash tun, with water gently warmed up to a certain temperature (about 160°); and in this way the

malt is changed into the sweet wort. A subsequent process of boiling splits up the sugar of the wort into alcohol, which remains in the beer, and carbonic acid gas, which for the most part escapes. What remains is secured by bottling, and makes the liquor effervescent. It is to this carbonic acid gas that champagne and kindred liquors owe their sparkling qualities.

The vinous fermentation is fostered by heat and motion. By these means, when quiescent, it may often be renewed, and the process carried on so long as there remains anything saccharine to ferment. When it has exhausted all the sugar in the solution, the resulting wine is called "dry." When it is arrested before that stage, the product is a fruity wine, more or less sweet. When the wine is bottled while in the act of fermenting, it takes shape as the class known as effervescent. When vinous spirit is superadded, as in the case of port, sherry, &c., the wine is said to be fortified.

This process, usually assumed to be resorted to in order to gratify strong northern palates, is declared by wine merchants to be a necessity, in order to preservation, which they would gladly escape. This is to us somewhat puzzling; but it would be aside from our present purpose to enter further into the matter.

Other points relating to wines—their imaginary virtues, and very real deceptions—we shall advert to in a little. We must first say what may be needful on the connected process of distillation, which always presupposes the process of fermentation.

3. *Distillation.*

Distillation, the fountain of such widely ramifying and tremendous influences, is a simple process, and is based on a simple principle. The process is that of converting a compound liquid into vapour in a close vessel, and passing the vapour into a cold one, where it is recondensed into a liquid, the object of the process being to extricate one component of the mixed fluid from the rest. The principle on which it proceeds is the fact that very few substances pass into vapour at precisely the same temperature. It takes a heat of 212° to vaporise water, but 173° suffices for alcohol. By heating the "wash," or complex fluid, then, to 173°, or a little more, the alcohol extricates itself in vapour from its less volatile companion, and duly reports itself in the receiver in the resumed form of a liquid. In its passage from the still through the spiral tube, or worm, in the refrigeratory, it gets condensed in drops and runnels, and is thence said to be "distilled." It is the very process by which nature supplies us with the dew and the rain. It is by no figure that our poets make these "distil."

It is not possible to obtain pure alcohol by distillation. It is always accompanied by the vapour of water, for which it has a great attraction, and by more or less of the natural oils found in the original solution. By repeated distillation these last may be separated, and part of the water, but never the whole. Even rectified spirit, or spirit of wine, in its ordinary

potency, as used in lamps, contains a fourth part of water. It is only by direct chemical treatment that absolute, or anhydrous alcohol is obtained. Its specific gravity is 793, being nearly a fourth less than that of the standard of water, which is 1,000. The lighter any ardent spirit is, therefore, the stronger is it in alcohol; so that by the aërometer, or by the hydrometer, the relative potency of these liquors is easily ascertained. The standard of strength fixed by the Excise is that known as "proof." Its specific gravity is 918·6, and its proportions of alcohol and water are nearly equal in weight, and of course somewhat less so in volume.

Such is the demon of distillation, as it has been so often and so naturally named. In its form it is simple enough; no black, sweltering, venomous fluid, swarming with serpents, and smelling strongly of the pit; but limpid, transparent, and with an odour pleasant rather than otherwise, could we but forget its deeds, and innocent enough if kept from fiery contact with palate, stomach, and brain, and sacredly confined to the shelf of the apothecary and artist. As it is, we cannot behold these trickling drops falling from the worm without being reminded of the Old Serpent, secreting a leprous distilment, over which, more appropriately than over their own "hell-broth," the hags of our dramatist might sing—

> "Double, double, toil and trouble,
> Fire burn, and cauldron bubble."

And the demon is always himself; in that one sense

true, self-consistent, his natural strength not abated, his fiery bite still the same, "like a staunch murderer, steady to his purpose," subtle of spring and deadly of sting. Had the vapour cloud of water been his only envelopment he would, from whatever substance set free, retain the same identity. He does so as it is; but under various *aliases*, the essential oils and other ingredients passing from the wine, the sugar-cane, the barley, or whatever else, and mantling it with the colour and character that stamp it as brandy, rum, whisky, and the like—those arch desolators of the earth. Need we wonder that even calm men of science should here warm into wrathful transports. "The art of extracting alcoholic liquors by distillation," Dr. Paris pronounces "the greatest crime ever inflicted on human nature." Finding no term of disaster strong enough to express his sense of the untold evil, he lays violent hands on the word "crime," for surely violent enough it is to apply it to a chemical art, and subjects it to high pressure to bring out his tragic meaning. And from his momentous point of view, who shall say he is wrong?

4. *Alleged Virtues of Wine.*

Wherein consists the magic virtue of this manufactured grape juice, natural or simulated, fermented simply or fortified, sweet or dry, drugged or doctored or plastered, old or new? Without plunging into the alcoholic question, chemical or physiological, which

awaits attention in its proper place, we have already data enough to determine for ourselves, at the bar of plain common sense, what dependence is to be placed upon wine as a medicinal agent.

It is said to "promote purity of the blood,"* when (to anticipate a little), to the precise extent in which it contains alcohol, it notoriously corrupts and vitiates the blood. It is said to "strengthen the muscular system,"† when, by virtue of the same ingredient, it both weakens muscular action and impairs muscular tissue. Other things are said with the like random facility, but surely none more innocently than this, that "nothing is more harmless than spirits when properly consumed"‡—a sentiment in which we entirely concur. In the internal sense, however, intended, it sadly needs explanation. We might cite the Highlandman's attempt to let the gun go off quietly; but this might be carrying pleasantry too far, as the respectable parties we are quoting probably mean simply that spirits are "properly consumed" when they are consumed at the proper time, and in the proper dose. But what is that dose, and when is that time?

If ever "wine is a mocker" it is when it dons the physician's cloak, and professes infallibly to cure. A more transparent sham was never enacted among men. It could not float itself for a single year, but for the aid of two potent factors—ignorance and collusion. The first is great, but the second is greater;

* Gilbey, *Wines*, ch. ii. † Ib., ch. vii. ‡ Ib., ch. vii.

for, after ignorance has been beaten down, collusion will still keep the field, and hug and belaud the darling enchantment. A vinous fact shall here furnish us with a symbolic illustration. "After every care and attention," say our wine authorities, "has been given to the bottling of Hock, it is still impossible to ensure perfect brilliancy; and to this fact is due the custom of drinking wines of this description from coloured glasses, as in the matter of wine it is always desirable to consult the eye as well as the palate."* Myriads of self-constituted dupes, who shut one eye and wink hard with the other, hold up between their vision and the wine the coloured glass of inveterate appetite or custom, and, though half conscious that it is all delusion, they cling to it as if spell-bound.

Those wine recommenders, commercial and professional, have themselves made such ugly rents in the mask of the "mocker," as almost to spare us the pains of exposing the sham. They tell us that "knowledge and improved education will no doubt before long work a change here"†—a hope we devoutly share. Dr. Druitt, after commending wine, truly and suggestively adds: "But first of all patients must be taught what *wine* is, and the right way to use it; and the difference between drinking pure *wine* as a refreshing beverage, and gulping down a *dram* of bad spirits disguised as wine, such as the *People's Own Sherry*, just to create a feeling of warmth

* Ib., ch. iv. † Ib., ch. i.

under their ribs." * Another writer, after setting forth the various medicinal qualities which he attributes to wine, and which, it is superfluous to add, are of a very dubious complexion, disenchants his readers, whose teeth have already begun to water over "the bare imagination" he has set before them of "port wine given with warm water, administered with a biscuit, at bed-time," by this rude and grim reality: "But during the last fifteen or twenty years its price has risen from 30 to 100 per cent.; and the port purchased at a vintner's by a poor invalid at four shillings a bottle is usually nothing but doctored British spirit that has been sent to Hamburg to be transmuted into wine." †

Let us, however, make the very large supposition, that these gigantic frauds, which now "practise and prosper" over a fascinated and victimised public, were so far swept out of the way that no wines were now current but such as could trace their authentic pedigree to the vine, should we then be safe? Not by any means. There remain all the ominous contingencies arising from oidium or wine disease, bad vintages, and relative inferiorities even between the same descriptions of wine. Those diseases make the wine turbid, ropy, mouldy, acid or bitter, and that to a degree that often completely changes the character of the fluid. We all know the difference between good and bad grapes; and this is trifling compared with

* *Report on Cheap Wines.*

† Chambers' *Encyclopædia*, Art. WINE.

the chemical depravations that follow. Vine disease, in the form of a vegetable fungus, like the potato disease, will continue for years; and wine dealers have sometimes overreached themselves by letting a thick-headed public a shade too far into the secret. Speaking of the oidium that prevailed in Portugal from 1851 to 1857, the Messrs. Gilbey say,—"No doubt, in many instances, the ravages resulting from the oidium were greatly exaggerated by the merchants, under the impression that their stocks would become enhanced in value; but in reality the results of such reports has been to deter many from drinking port wine; and this fact will account for the imports of the wines of Oporto not showing the same proportionate increase as the wines of other countries."*

Apart, however, from positive disease, such is the variation of the seasons that the extensive merchants just cited distinctly and repeatedly do their large commercial constituency to wit, that there is really no guarantee for obtaining good and genuine wine beyond the confidence to be reposed in "the integrity and judgment of the merchant."† They pronounce it "quite impossible that the general consumer should be able" to judge of "any particular estate or brand," and leave to him only "the cultivation of confidence between the public and the merchant at home." Nay, much can be known only to "the merchant in Bourdeaux,"‡ or in other parts of the field; and other cautions are given to the same effect.

* Gilbey, ch. vii. † Ib., ch. iii. ‡ Ib.

But let us go as far as to assume that all the seasons shall be good, what has wine to offer us, even as medicine, to compensate us for the outlay which its use involves? "Putting aside taste and smell as standards of comparison," says a writer we have already quoted, "most of the essential dietetic and therapeutic properties of wine depend upon the *alcohol*, *sugar*, and *free acids*, especially *tartaric acid*, contained in it."* What we are to think of alcohol as a "dietetic" we shall see in course. Of its therapeutic character the less said the better; but if really needed under this aspect, is it to be sought for in expensive and often spurious fluids, where itself is often made to lurk in coarse and spurious forms? As for the other two ingredients, sugar and tartaric acid (for the other acids are of little account), they are of all things the most commonplace. As for the ethers, which are generated during or after fermentation by the combination of oxygen with some of the vinous acids, they exist in exceedingly small quantity, otherwise "they are very objectionable."† Of the volatile acids, by far the greater portion is acetic acid, or vinegar, formed by the oxidation of alcohol. These odoriferous trifles are mightily magnified as giving flavour and bouquet to the wine. The precipitation of acids and some of the colouring matter, as the wine becomes old and "matures itself," as the phrase is (meaning to rush towards its decay), makes it mellow in flavour and tawny in

* Chambers' *Encyclopædia*, Art. WINE.

† Gilbey, ch. xi.

colour—changes trivial at best, and medicinally of no account; and yet professional belauders will speak of them as if they evolved the very *elixir vitæ*, and will parade the volatile ethers as if they were the veritable ethereal essence of the human soul. And the uninitiated say Amen! and even "love to have it so," and evince the strength of their faith and the length of their purse by giving fabulous prices for long-kept wines. "Indeed, such is the demand for very old wines of the best vintages, that as much as £35 per dozen bottles, or £17, 10s. per gallon, was realised at a sale for port wine of the year 1820, only a year or two since;"* and higher prices still have sometimes been given.

How humiliating to find ourselves on this subject of the medicinal value of wine no nearer satisfaction than did Pliny at the commencement of our era. So truly is this the case, that his "conclusion of the whole matter" we can also accept as ours. "There is no subject," he says, "that presents greater difficulties than this, or, indeed, a more varied field for discussion, it being extremely difficult to pronounce whether wine is more generally injurious in its effects or beneficial. And then, in addition to this, how very uncertain is it whether, the moment we have drank it, it will be productive of salutary results, or turn out no better than so much poison." He then states that from Asclepiades down through all his commentators, the writers on the medicinal qualities of wine are "almost innumerable." These he professes to examine "with all

* Chambers' *Encyclopædia*, Art, WINE (1868).

that gravity which becomes a Roman," not, indeed, as a physician, but "as a careful investigator of the effects which wine is likely to produce upon the health of mankind. To treat, however (he adds), of the medicinal properties of each individual kind would be a labour without end, and quite inexhaustible; the more so, as the opinions of medical men are so entirely at variance upon the subject."* After mentioning three noted kinds of wine—the Surrentine, Alban, and Falernian—he shrewdly observes:—"Each person as he finds a wine most to his taste, extols it as superior to all others. Suppose, now, that all persons were quite agreed as to the superiority of some particular kind of wine, how small a proportion of mankind would be enabled to make use of it. As it is, *even the rich never drink it* in an unsophisticated state; the morals of the age being such, that it is the name only of a vintage that is sold, the wines being adulterated the very moment they enter the vat. Hence it is, by Hercules, —a thing truly astounding—that, in reality, wine is more innoxious in its effects in proportion as it enjoys a less extended renown. The three kinds, however, of which we have made mention, appear to have maintained, with the least diminution, their ancient repute."† He then describes the effects of these as of a very mixed description, and in terms that clearly indicate their alcoholic character.

Pliny, in discussing the medicinal virtues of wine, gives incidental but ample evidence of their alcoholic

* B. xxiii. 19. † B. xxiii. 20.

character. Thus, he says, "Wine refreshes the stomach, sharpens the appetite, takes off the keen edge of sorrows and anxieties, warms the body, acts beneficially as a diuretic, and invites sleep." Who can fail to read between these lines the flushing, stimulating, narcotising action of the vinous spirit? "According to Asclepiades"—foolish old sage!—"the virtues possessed by wine are hardly equalled by the majestic attributes of the gods themselves." *

This amiable and boundless delusion, born purely of narcosis, has easily propagated itself down the ages. In no spirit of solemn banter, but in downright earnest, one Theoricus, cited by old Hollinshed, three centuries ago, in his well-known *Chronicle*, thus descants on the miraculous virtues of the alcoholic poison,—"It sloweth age, it strengtheneth youth, it helpeth digestion, it cutteth phlegme, it abandoneth melancholie, it relisheth the heart, it lighteneth the mind, it quickeneth the spirit, it cureth the hydropsia, it healeth the strangurie, it pounces the stone, it expelleth gravel, it puffeth away ventosity; it keepeth and preserveth the head from whirling, the eye from dazzling, the tongue from lisping, the mouth from snaffling, the teeth from chattering, and the throat from rattling; it keepeth the weasan from stifling, the stomach from wambling, and the heart from swelling; it keepeth the hands from shivering, the sinews from shrinking, the veins from crumbling, the bones from aching, and the marrow from soaking." †

* B. xxiii. 22. † Quoted by Dr. Grindrod, *Bacchus*, ed. 1851, p. 277.

Those ancient notions of the medicinal virtues of wine are not worth quoting. As yet science there was none. Empiricism, credulous to all lengths, usurped its place. All medicines were sovereign specifics; hence alcohol was an antidote to many things, and many things to alcohol. "The conceits of the medical men," says Pliny, "in relation to these [artificial] wines, have really passed all bounds." * This remark he might have universalised. And yet the eagle could not rise above his circumambient element. Even Pliny permits himself to say, "Persons who have used the precaution of first taking saffron in drink will never experience surfeit or headache, and will be proof against inebriation. Chaplets, too, made of saffron, and worn on the head, tend to dispel the fumes of wine." † But incisive glances of truth often condone these shortcomings; as when he declares nature's remedies few, and "selected from a due appreciation of cause and effect, and not from mere guesswork;" that many medical specifics of his day were prescribed in "downright impudence;" that "as to health, we can enjoy that blessing without their assistance;" and that "the greater reason, then, has luxury to blush at its excesses." ‡

"We may conclude, by Hercules! that pleasure has now begun to live, and that life, truly so called, has ceased to be (*vita ipsa desiit*)." § Such is the weighty reflection of Pliny in beginning to tell us of the vine.

* B. xxiii. 26. † B. xxi. 81. ‡ B. xxii. 56.
§ B. xiv. 2.

He laments the general oblivion that has settled down on this theme—a regret we must all share; for numberless as are the allusions of the poets and other writers to ancient wines and drinking usages, "the knowledge of the essential properties of the ancient wines is a sealed book to us for ever." * We have proof, *satis superque*, that they were, as a whole, more or less intoxicating, and that then, as now, and all the world over, drink, drinking, and drunkenness had much in common. Antecedently, we must conclude, from the immature stage of the arts and sciences pertaining both to vine rearing and wine-making, that the ancient wines were much inferior to the modern. We further know that they must have often been very nasty; for "besides salt water, they infused into them assafœtida, tar, bitumen, pitch, myrrh, aloes, gums, pepper, spikenard, poppies, wormwood, cassia, milk, chalk, bitter almonds, and cypress. All these were steeped, each or more than one of them, in the different wines drunk by both Greeks and Romans." † We can also clearly discern the dear, delicious delusion which the ancients could, like the moderns, practise on their better selves when some pretext was wanted for getting at the vinous stimulation. The apotheosis of age was carried by them to a degree which no connoisseur could now venture to defend. They noted exceptionally good vintages, such as that of the Opimian year—the year

* Redding on *Modern Wines*, 3rd ed., p. 18.

† Redding, p. 7.

of Rome, 632, when Opimius was consul the wine of which was much prized for a whole century; and they inscribed the consul's name on the amphoræ (many of which still exist) to denote the year of the vintage. Particular wines, of course, acquired special celebrity.

The poets, of course, abound in frisky laudations of wine in general, and choice kinds in particular, of which fascination we must disenchant ourselves to get at plain facts, and even of these little residuum will remain beyond the connected drinking usages and the often drunken results. The poets are by no means consentaneous, or even individually self-consistent (except within the elastic limits of their poetic licence), in describing the body, flavour, or even colour of their favourite wines; while of their comparative potencies they had, of course, no test whatever, except what they might be able to work up from the depths of their inebriate consciousness. The most relieving fact seems to be, that in the countries of the vine the wines in common use were, and still are, those known as "pure" or "natural"—wines that are intoxicating only in the degree in which the process of fermentation generates alcohol.

5. *The Sherry Controversy of* 1872.

Some years ago, a fatal incident occurred at Blackburn (the sudden death of a man who had drunk four gills of sherry), which briskly revived the wine controversy, never very long at rest. The highest authorities on the subject gave expression to their views in

the *Times* in December, 1872, and the *Times*, *Saturday Review*, and other journals reviewed the discussion. One writer, in defence of sherry, mentioned 26 per cent. of proof spirit as the average strength naturally generated. Mr. Denman, the wine merchant, in correction of this, declared that Spanish wines do not generate an average of more than 22 per cent., but that the sherry of commerce is seldom imported containing less than 38 to 40 per cent. of proof spirit, and must thus be very largely fortified. This was confirmed by Mr. Burton, formerly connected with the Custom House, who stated that some parcels contained even 50 per cent. of proof spirit. The *Saturday Review* quoted Dr. Druitt as showing, in contradiction to the Messrs. Gilbey, that when wine is properly made it does not require fortifying; and he quotes Dr. Gorman, long a resident in Spain, as declaring, in his evidence before a Committee of the House of Commons, in 1852, that no natural sherry comes to this country, that it is all mixed and brandied, and that the less perfect it is, the more brandy is added. He further says,—"It is not necessary to infuse brandy into any well made sherry wine; if the fermentation is perfect, it produces alcohol sufficient to preserve the wine for a century in any country." The Messrs. Gilbey follow with a long letter in the *Times*, in which they admit that "both Spain and Portugal can and do make large quantities" of unfortified wines, "which are perfectly safe so long as they are not destined to travel, and are indeed the ordinary beverages of those countries;" but they insist

that they must be fortified in order to be safely exported. This is more than we can readily believe, after Dr. Gorman's evidence to the contrary; and we have the less confidence in it because another statement of theirs, to the effect that fortifying is to the Spanish merchant's loss, is directly gainsaid by Mr. Burton, late of Her Majesty's Customs, who affirms that fortification is "generally resorted to for the simple commercial reason that common alcohol is very much cheaper than the fermented juice of the grape."

In that same discussion Dr. Thudichum, a very high authority on wine, brings to light many hidden things of darkness pertaining to the manufacture and effects of fortified, plastered, and doctored wines. Another eminent experimenter, the late Dr. Edward Smith, declared that "the added alcohol is infinitely more prejudicial to the health of the body than that which was generated by the grape juice by the natural process;" that "the action of alcohol is not the dietetic action of the wine," and that "liqueur," or some such name, and not "wine," "should be applied to port, sherry, and other fortified wines." The *Times* thus clinches the matter:—"The general result is that what many people purchase and use as wine is simply a rather strong grog, with an admixture of flavouring matters, and containing a very appreciable quantity of sulphuric acid—a substance which is known in commercial usage as oil of vitriol."

"Grog" is an awfully vulgar name for so very respectable a thing; but on the wine merchant's showing it

is demonstrably correct. The Messrs. Gilbey, in their letter to the *Times* of December 13th, say :—A bottle of strong wine, such as port or sherry, contains generally about one-third of spirit, while a bottle of light wine (say, claret or hock), contains only about one-fifth of spirit. To put it more simply: three glasses of strong wine represent one glass of brandy, and five glasses of light wine are equal to one of brandy." Now, put a glass of any spirit into a tumbler and add two glasses of water, and you have grog; take another tumbler, and to the one glass of spirit you put into it add five of water, and you have weaker grog. Colour, sweeten, season, adulterate it a little, and in the former potency of grog you have the thing called port, and in the latter sherry.

Dr. Druitt divides bad sherry into the sickly and the sad. By the sickly he means those vile sorts, fiery and yet sickly sweet, advertised incessantly as the "Marylebone," the "People's Sherry," the "Lord Mayor's Own," &c. By sad sherry he means a thin, dry kind, often hotter than spirits of wine, and smelling like nitric ether. It may be a question, says Dr. Thudichum, whether the process of winemaking he describes "leaves much room for adulteration, or whether it is not itself adulteration." There seems hardly room for any question on the subject.

6. *Vinous Adulteration.*

We are now on the margin of a boundless ocean—that of the modern methods of adulterating wine. "In

the old wine countries of Europe," says the *Times* (April 18, 1872), "it may now fairly be doubted whether such pure wine as we have been imagining is ever manufactured, unless for the immediate use of some imperial or princely owner of a vineyard of great repute. Adulteration of some kind long ago became the rule, and probably originated in the liability of imperfectly fermented wine to undergo further and injurious changes, which the first admixtures were intended to arrest." After some explanations on this head, the writer goes on to say,—"Wine thus fortified," as it was termed, "received also an addition of sugar, intended to mask the taste of the alcohol. This adventitious sugar, unlike any remaining natural sugar of the grape, is prone to undergo decomposition in the human stomach, to occasion the presence there of a quantity of acid, and to give rise to painful and distressing forms of indigestion, as well as to more grave ulterior consequences. Consumers, therefore, called out against *acid*, and ignorantly believed that the mischief was done by the acids or acid salts natural to wine, and discoverable in it by the palate, instead of by other matters which underwent acidification in the body. They asked for wine which *was not acid*, when they should have asked for wine which *would not develop acid*. Hence, it became a point with the dealer to remove the malates and tartrates, or to conceal their presence, and hence, probably, arose the custom of 'plastering' wine; that is to say, of adding sulphate of lime, otherwise called gypsum or plaster of

Paris, to the crushed grapes or the fermenting juice. The custom, though not unknown in classical times, was perhaps new, or at least not universal, in Shakespeare's time, because he makes Falstaff angry at the lime in his sack; while of later days there has probably never been any sack without lime. The effect of the addition is to destroy the natural acid or sub-acid flavour, to remove the tartaric and malic acids, and to leave sulphates, mostly sulphate of potash, in their stead. These three processes, fortifying, sweetening, and plastering, have been carried on well-nigh everywhere, until the very conception of pure wine has been rendered non-existent for the majority of consumers. The effect of the fortifying, as shown in good samples of port and sherry, is to render the liquid too strong for use as a beverage, and, by impressing upon it a more stable character, greatly to delay the progress of the changes which lead through maturity to destruction. The mixture requires to be kept for a very long period before it will attain the greatest excellence of which it is capable. The sweetening disguises both alcoholic strength and the bitterness of sulphate of potash, and promotes the occurrence of heartburn and of gout. The plastering, by throwing down the natural acids, takes away ingredients that assist the formation of ethers, and robs the wine of the power of developing its higher qualities. The resulting sulphate of potash is in the first place nasty, and in the next place it is a moderately active purgative, "nearly akin to Epsom salts."

Thus speaks the *Times*, not in the interest of total abstinence, but purely in the pursuit of good wine. Charles Kingsley, somewhere in his writings, names a copious list of good things, and having mentioned, among these, the item of "good port wine," he naïvely adds, in a parenthesis, "but there was none." Such is the goal at which all these explorers half confess that they are destined to meet. As for "the cheap light wines which were to regenerate the nation, their cheapness," says the *Saturday Review* (June 22, 1872), "is too frequently of the kind which is proverbially associated with and accounted for by nastiness." Fortified wines are still worse. Dr. Druitt, in his *Report on Cheap Wines*, pronounces them "expensive when good, and suspicious when cheap;" and yet, if what he says of them be true, how is it possible that they should be ever "good?" He has no total abstinence besetment to overcome. On the contrary, "there is," in his judgment, "no greater public benefactor than the honourable wine merchant." And yet he gives good reasons for believing "the effect of added alcohol upon wine to be bad," the third of which reasons is that "it makes the wine turbid," and "precipitates albuminous matters, which ought to have been got rid of by fermentation." It is in this way, he tells us, "that gouty port can be rapidly transformed into the *prime port, old in the wood, tawny and very dry*, which is sometimes offered to the ignorant at low prices." But without descending to these inferior specimens, here is his account of what we are to expect from

"fortified wines" as a class, from which it will be seen that though sweet in the mouth, in the belly they are likely to be bitter:—"The ill effects of fortified wines are twofold: first, the headaches and dyspepsia which arise from the crude added spirit, which are not caused by the natural spirit developed in well-fermented wine; and secondly, the *gout*, which is the offspring of those half-fermented matters which the spirit keeps in check. Spirits have enough to answer for,—nutmeg liver, delirium tremens, dropsy, Bright's disease, and the like. But much as spirits have on their heads, no one accuses them of causing the *gout;* this is notoriously the offspring of strong, sweet, ill-fermented liquors—of which port is the chief—as ale, stout, and fortified wines. This is the opinion of Charcot, Ball, and the ablest Paris physicians, as well as of their English brethren." But what of sherry, in which so many confidingly put their trust? Dr. Druitt replies: "There are two classes of bad sherry, which the physician may call the sickly and the sad. By sickly sherry is meant those detestable liquids—hot, fiery, and yet sickly-sweet—that are advertised incessantly as the *Marylebone*, the *People's Sherry*, the *Lord Mayor's Own*, &c., &c. By sad sherry is understood a dry liquid, often hotter than any spirit of wine could make it; thin, with little body, but with a smell like that of nitric ether; so dry is it that there is no wine to be tasted in it. There is a thin, sad stuff, which often borrows the name of *Manzanilla*, bitter,

indigestible, and acescent in the stomach, said to owe its bitterness to chamomiles which grow near the vines, but in reality to spoiled wine pickled with spirit. There are some natural or unbrandied sherries of low price, which keep very badly, are very thin and flat, have no body, and are not wholesome, and seem to have had their acidity neutralised by artificial means. . . . Persons troubled with acid dyspepsia and the allied diseases, gout, rheumatism, sick headaches, &c., &c., must drink either the best sherry or none."

If such persons are wise, they will choose the latter alternative, for these two good reasons, not to mention more,—first, how can any ordinary unit of that public which seems to exist to be preyed upon, assure himself that the sherry he buys is really "the best?" and secondly, how certain is it that anything genuine in the whole business is rapidly becoming a dissolving view. "It is well known," says the *Saturday Review* (June 22, 1872), "that port and sherry are more or less artificial concoctions, the better sorts of which really have genuine port or sherry as an element in their composition; but large quantities of liquor are sold under these names in which there is not a drop of the genuine wine. The chief business of the Roussillon vineyards is to supply a wine which is exported into Portugal, to be there doctored into so-called port; and it need hardly be said that the ceremony of a visit to Portugal is not unfrequently omitted."

There is one department of the modern art of vinous

adulteration so bold in its conception, and so courageous in its execution, that we may here present it in distinct relief. It may be termed the department of creation *ex nihilo*, or spurious manufacture. There are Christians not a few who evince a sensitive horror lest any communion wine should be introduced that is not a genuine product of the grape. Do such ever bethink them that their favourite wines, for aught they can tell, may be mere chemical concoctions, simulating wine, with a wholly artificial body, and with copiously infused alcohol as their vitalising and indwelling soul? Let these sensitive brethren know and understand that this imitative manufacture is expanding itself, in these days, to an extent perfectly enormous in the wine-producing regions of France and Germany. "Brewers' chemists" are a guild in this country, the very name of which is portentously significant. The great winemakers on the Continent have their chemists too, deep in the mystery of wine dyes, artificial ether, and general bouquet-simulation. "Such agencies," says the *Times*, "were employed in most vineyards; and their use has culminated in the enormous fabrication of artificial liquids called wine, and possessing, indeed, a basis of wine of some sort, which has for some time had its headquarters at Cette." After remarking that "it is bad enough to have wine fortified, and sweetened, and plastered into the legitimate port and sherry of the middle-class festivities of a dozen years ago," the leading journal goes on to say,—"What we now see in France and

Germany is a prostitution of scientific knowledge to the accomplishment of wholesale adulteration on the largest scale,—adulteration by which we shall buy as wine a purely artificial and factitious compound, a medicated dilution of alcohol, and nothing more."

If anything were wanting to cap this climax of imposture, it is the open defence it has obtained at the hands of professional men. Drs. Thudichum and Dupré, in their *Treatise on the Origin, Nature, and Varieties of Wine*, have committed themselves to the recommendation of these "sugar-infusion wines" as "resembling natural wines in all essential qualities," and "as containing all the essential ingredients, and almost in the same proportions, as the natural product." The *Times*, in its review of their work, indignantly protests against this verdict, and is backed in this by some of the leading medical journals. It says,—"It is fortunate that the absurdities and inconsistencies of the foregoing paragraph are so glaring, that it is hardly necessary to point them out. The opening assertion about perfect bouquet is one that the authors do not seem to adopt; and we confess that we should find it hard to believe them if they did. . . . But no amount of chemical knowledge that Drs. Thudichum and Dupré may possess, can shut our eyes to the essential wrong-doing of the processes which they describe, and in some degree advocate." After some other remarks, the writer thus proceeds,—"We have not hitherto made wines in England, because we have only a

small growth of grapes, and cannot depend upon their ripening in our climate. If Drs. Thudichum and Dupré are right, these circumstances need no longer stand in our way. We may, in spite of the niggardliness of nature, make all the wine we want, and render ourselves independent of the duties and treaties of commerce. The quantity of grapes employed has only an insignificant bearing upon the quantity of wine produced, which is chiefly determined by the supply of water and of artificial sugar. Unripe grapes are better than ripe ones, for they yield a must which will admit of more free dilution. In fact, there seems to be no reason, save want of knowledge or want of enterprise, why the proprietor of a single bunch should not use them as a sort of talisman with which to supply the cellars of the world!" To the same effect the *Saturday Review* says,—"The manufacture of wine is now conducted on such highly scientific principles, that grapes are gradually being dispensed with. According to Petiot's process 60 hectolitres of juice can be converted into 285 hectolitres of so-called wine, by adding a sufficient quantity of sugar and water to make up the difference, and squeezing the husks of the grapes five times over. In their chemical enthusiasm Drs. Thudichum and Dupré are so enchanted with the ingenuity of this remarkable decoction, that they declare it to be not only equal, but superior, to real wine! There is no accounting for tastes, and if people prefer 'sugar infusions' to wine, they are at liberty to please them-

selves; but it is surely rather going too far to call them wine."

The darkest hour precedes the dawn. As in the Indian cycles, when things have reached their worst they proverbially begin to mend. Professed wine that can claim no kindred with the vine, being a sort of contradiction in terms, convicts the scientific wine-making problem of being a *reductio ad absurdum*. Hence the *Saturday Review* shrewdly observes,—"It is perhaps just as well that the science of factitious winemaking should have reached this advanced stage. When the manufacturers of sham wines shall have finally abandoned the use of the grape, as a weak superstition of primitive times, the owners of vineyards will perhaps begin to reflect that they had better take their stand on the wholesome purity of the natural juice. The authors of this treatise justly observe—though from their praise of sugar infusions it may be doubted whether they appreciate the full force of the observation—that the more the produce of a distinct variety of wine becomes obscured by mixing, or sweetening, or brandying, the easier it is to imitate it. Hitherto the wine-growers have been playing into the hands of their most dangerous rivals. It is impossible to imitate successfully the best juice of the grape; but the more the juice is mixed and doctored, the less important it becomes as an ingredient, and the easier it is to do without it."

Thus the gullible are gulled, and deception has its own. And were it not for the conventional charity

which "believeth all things" but the truth, which keeps the gate of the much receptive and all-confiding British throat, and which is much too fashionable to ask any question, either for conscience' or stomach's sake, as if in such a matter it were delicious to be duped, the sham would long ago have been pricked into collapse, and exploded into thin air, instead of continuing at this hour to darken with its shadow half the nations of Christendom.

On the relative potency of wines, considering that the name of the several varieties is legion, we can only speak in general terms. The maximum strength of "light" wines may, in terms of the Government standard, be taken at 26 per cent. of proof spirit, though as a rule they rarely exceed 22 per cent. According to the same standard, the maximum strength of "strong" wines is 42 per cent., the average being more nearly 36 per cent. Of this, 24 per cent. may represent the proportion of alcohol generated naturally in the process of fermentation, the remainder being grape spirit added for "fortifying" purposes. "A bottle of *strong* wine, such as port and sherry, contains generally about one-third of spirit, while a bottle of *natural* wine contains only about one-fifth of spirit; or, to put it more simply, three bottles of *strong* wine represent one bottle of brandy, and five bottles of light wine are equal to one of brandy." * This we here quote anew to enable us to

* *Treatise on Wines*, &c., by W. & A. Gilbey, ch. ii.

gauge somewhat the receptive capacity of our five-bottle men of the olden time.

7. *Adulteration—continued.*

Imagine an "artful dodger," spiritual or incarnate as you may choose to conceive, sitting serene in the innermost chamber of some mystery of iniquity, and driving his sovereign drift without let or hindrance. Picture him surrounded with a set of catspaws or minions, not one of whom, nor all of them put together, are one-thousandth part as wicked and as mischievous as himself, though greatly his inferior in address, craft, and fascination. To crown the supposition, as you follow the havoc that is wrought by the chieftain and his subordinates, but most of all by him, and find the volumed malediction poured forth on those subordinates alone for all misdeeds, just fancy the chuckle of malignant delight with which this "arch-artificer of fraud" sees nine-tenths of the blame heaped on the heads of the minor actors, while he, the author of nine-tenths of the mischief, escapes practically unimpeached.

Precisely such a dodger is alcohol; and his subordinates, on whose heads the concentrated vengeance of their united mischief falls, are all that class of substances—from such comparative innocents as water, sugar, and salt, to the more rascally varieties of cocculus Indicus, copperas, capsicum, and grains of paradise—which are known in common as adultera-

tions, and which blend their virtues so very extensively in "fortifying," as the phrase goes, the liquid stronghold of alcohol.

The *Daily Telegraph*, some years ago, instituted an inquiry into the condition or actual composition of several varieties of liquors, both distilled and fermented; and the commissioner, to whom this piece of delicate manipulation was entrusted, published the result in two articles in that paper, that bear the titles of "A Quarten of Gin," and "A Pint of Beer." As respects the gin, he procured eight different samples from public-houses in the poorest localities in London, all of which betrayed ample adulteration by water and sugar; but with the exception of a few sharp and "toothsome" ingredients, such as capsicum and Cayenne pepper, there was not much of a very deleterious character detected. His porter samples yielded similar results—the prominent adulterative agent in this case being salt. But what need of a dwarf's hand to help a giant with his work! Alcohol himself is the "strong man armed," the angel of the strong waters that is able of his own resources to "cast down strong men wounded," and that with a fascination that makes them welcome the blow. And so the commissioner arrives at the sound and sagacious conclusion, that "the drunkenness which is said to peculiarly afflict the lower orders of humanity is, after all, real, unadulterated drunkenness; and that the coal-heaver who swigs pots of beer until he is fairly floated off his herculean legs, is as genuinely drunk as

his affluent brother, whose means enable him to indulge in the genteel inebriation that champagne affords. It is all a question of alcohol; and the purchaser of a humble pint of porter may be tolerably sure of getting twopenn'orth of the spirit of tipsiness for his twopence."

More recently (for this subject is never long without its witness) exposures of drink adulteration came upon us from quarters so various, that we might almost describe them as from the four winds of heaven. Towards the close of 1876, the *Lancet* says, —"According to the *Economist*, the Paris syndicate of wine merchants is most anxious to put down the practice of colouring wine. They complain that since the harvest of 1875 the practice 'has assumed proportions truly disquieting, from the point of view of the reputation, the quality, and the future of French wines, not less than from that of the public health and the public morals.' The substances used in the traffic are more or less poisonous, such as arsenical fuchsine, rosaniline, &c., the former being specially noxious, as proved by experiments on dogs, as well as by the effects on a laboratory attendant. The syndicate would not prevent the mixing of wine, nor even the addition of foreign substances; they would permit the strengthening of weak wine by adding alcohol, and the sweetening of acid wine by adding sugar. But they will not go farther than this."

About the same time, M. de Colleville, in a letter (dated Brighton, Oct. 3, 1876) to the *Temperance*

Record, on the subject of Continental adulteration of wine, says:—"Whosoever is wishing to see with his own eyes the truth of this statement, has but to consult the numberless documents to be found in the French columns of such official newspapers as the *Moniteur Universal*, the *Moniteur Officiel*, the *Bulletin des Lois*, and *La Tempérance* (a quarterly, *Imprimerie E. Donneau*, 1873–1876). In their pages is to be read all that has been done since 1789 by the French authorities against the various sophistications or adulterations of wines, beers, ciders, brandies, and all strong drinks, without being able to check the perpetual increase of those fraudulous manipulations." He then refers to a variety of authoritative documents and syndical movements for the suppression of these malpractices; and in particular to one that appeared in the Montpellier newspaper "not later than last week," embodying the decision of a particular syndicate, the text of which he translates and inserts. After setting forth in a lengthened preamble the details of the adulterative frauds, the syndicate sets forth its decision, which is, in brief, to the following threefold effect:—*First*, to call in all suspected wines, and subject them to renewed analysis; *secondly*, to bring all adulterators and conniving dealers, so far as they can, to legal punishment; and *thirdly*, to give the greatest publicity to condemnations legally obtained. So far good; but with what probable result? Let M. de Colleville reply:—"It is superfluous to add that this legal instrument, and the letters of the Wine

Syndicate of Bercy, Paris, and of M. Paul Massot, will do but very little towards removing the ever-going-on adulterations they are intended to suppress. Wines are sophisticated, more or less, nearly everywhere on the Continent, except, of course, when they are really to be drunk by the winemakers. We hope the above information will—at least for unprejudiced British readers—settle the Continental adulteration of wines amongst those facts which it is impossible to deny; and will do that in spite of the tolerance of M. Germont-Delavigne, his association, and so many others, who are so willingly consenting to poison themselves and to enrich the exchequer of their nation at the expense of public morality and health." He then makes reference to some recent cases of conviction, and also to an official note published in the *Journal Officiel*, declaring that in Paris and its department fraudulent manipulations of fuchsine and other colorating substances had attracted the attention of the police office, and that enormous quantities of poisoned wines and of adulterating dry and liquid mixtures had already been confiscated. Finally, he mentions a Frenchman who has discovered a chemical paper which, being dipped into wine, becomes pink if the wine is mixed with arsenical fuchsine.

To turn to another quarter, to the far west, it appears that in a work entitled, *Sporting Adventures in the Pacific*, the author, Captain W. R. Kennedy, R.N., furnishes the following recipe, which he states was

found upon the person of the proprietor of a Californian drinking-saloon :—"For whisky—ten gallons of kerosene, three pounds of potash, and one ounce of strychnine, mixed with soft water. If gin is required, add *quantum sufficit* of oil of juniper." This, it has been justly remarked, may appear, even to those who do not believe in teetotalism, a horribly poisonous compound; but it is not an atom worse than are many of the French clarets, the tempting red colour of which is, according to official reports, due to the use of arsenical preparations.

To these illustrations of how needful it is to look before we drink, we add the following pertinent and pithy statements of the Rev. Dr. Holbrook of New York :—

"Even admitting all that is claimed as to the benefits which flow from the abundance of pure wine, it is impossible to prevent adulteration, or to guard against the substitution of a fraudulent article under that name, which can be manufactured at a much cheaper rate. It is a well-known fact that but a very small proportion of what is sold as imported wine ever crossed the ocean, or contains much, if any, of the juice of the grape. Most of the so-called wine that is sold is made from whisky, coloured and mixed with other ingredients, and to a great extent poisonous and hurtful. The writer of this, a few years ago, heard a temperance lecturer, in a large assembly in Chicago, challenge the production of a single pint of so-called wine from any liquor establishment in the city, offer-

ing one hundred dollars therefor, that should contain, on being analysed, a particle of grape juice, and the challenge was never accepted; and the speaker said he had often made the same proposition in other places with the same result.

"A few years ago, while the writer resided in California, there was a large convention of grape-growers and wine-manufacturers held at Sacramento, the capital of the state, when one extensively engaged in the business delivered an address, which was published. He stated that it was a discouraging fact that so much counterfeit wine was sold for the pure Californian article; and he declared that to such perfection was the art of adulteration carried, that the best judges could not detect the fabrication. He illustrated his point by an historical fact. George IV. of England was a great wine connoisseur, and yet he was once deceived by some of his household retainers, who substituted a counterfeit article for some old Continental wine which he had been reserving for a special occasion, but which they had consumed, and the fraud was not detected by the king."

Thus the more we dig into the chemistry of wines the more worms will appear. Besides albuminous colouring, and other matters, we find ourselves among a happy family of free acids and salts, and in an atmosphere where flits a subtle sisterhood of ethers, all bearing significant and somewhat ominous names. To this add positively adulterating ingredients—water, the most innocent—fortifying alcohol, probably the

most guilty—with a long tail of artificial colouring matters, lime salts, tannin, alum, lead, copper, cider, and perry. These are pointed out by Dr. Parkes, who adds that port wines, as sold in the market, are at best but a conglomerate of true port, with other three kinds of wine; while inferior varieties of port "are still more highly adulterated with logwood, elderberries, catechu, prune juice, and a little sandalwood and alum." He adds, as highly significant, "that receipts are given in books for all sorts of imitation wines." *

We would not be satirical in a question so grave; but we are strongly tempted to ask, Is it because of this multiformity of ingredients, natural and artificial, that wine is so freely and multifariously prescribed? Does it cure, on the principle of the famous black bottle, into which an eccentric physician put a trifle of every medicine he mixed, and when asked why, gave as his reason that he kept its motley contents for cases of complicated disease? Verily the bibulous connoisseur who holds up the wine-glass so sapiently between his eyes and the light, has more need than he often thinks for a high analytical faculty of mouth and nose.

It may be deemed cruel—for there is a certain pleasure in delusion—to disenchant the indulger who falls into the Siren's arms without any question either for conscience or for stomach's sake; but it is right to inform him of some of the ingredients that

* *Manual of Practical Hygiene*, 4th ed., 1873, p. 268.

find their way into his much lauded cup. Truly it resembles that of Circe—"a cup with many murmurs mixed." The writer of the article on "Adulteration" in the new edition, now in course of issue, of the *Encyclopædia Britannica*, says,—

"The adulteration of intoxicating liquors is provided for by the Licensing Act, 1872 (35 & 36 Vict., c. 94); and in this Act there is a schedule of substances called '*Deleterious Ingredients*,' which are considered to be adulterations. They are—*cocculus Indicus*, chloride of sodium, or common salt, copperas, opium, Indian hemp, strychnine, tobacco, darnel seed, extract of logwood, salts of zinc or lead, alum, and any extract or compound of any of these. The execution of this Act rests with the police authorities and the Inland Revenue" (Vol. I., p. 167).

After disposing of a long list of adulterable commodities, the writer comes to "Wine and Spirits;" and here there opens upon us a perfect Pandora's box, of which the following is a fair sample of the outflying plagues :—

"In modern times the art of adulterating wine has been brought to great perfection; for it consists not merely in the blending of wines of different countries and vintages, but in the use of materials which are entirely foreign to the grape. Port wine, for example, is manufactured from Beni Carlos, Figueras, and Red Cape, with a touch of Mountain to soften the mixture and give it richness—the body and flavour being produced by gum-dragon, and the colour by

'*berry-dye*,' which is a preparation of German bilberries. To this is added the washings of brandy casks ('*brandy-cowe*') and a little salt of tartar to form a crust. Sherry of the brown kind and of low price is mingled with Cape and cheap brandy, and is flavoured with 'brandy-cowe,' sugar-candy, and bitter almonds. If the colour be too high, it is lowered by means of blood, and softness is imparted to it by gum-benzoin. Pale sherries are produced by means of plaster of Paris or gypsum, by a process called 'plastering,' and the effect of it is to remove the natural acids (tartaric and malic), as well as the colour of the wine. In this way a pale, dry, bitter, and subacid wine is produced, charged with the sulphates of lime and potash. Large quantities of what are called clarets are manufactured in this country from inferior French wine and rough cider, the colour being imparted to it by turnsol or cochineal. Madeira is produced from Vidonia, with a little Mountain and Cape, to which are added bitter almonds and sugar. Even Vidonia and Cape are adulterated with cider and rum, carbonate of soda being used to correct the acidity. Common Sicilian wine is transformed into Tokay, Malaga, and Lachryma Christi. Champagne is produced from rhubarb stalks, gooseberries, and sugar, the product being largely consumed at balls, races, masquerades, and public dinners. Of late, too, since the investigations of Petiot, Thenard, Gall, Hussman, and others, the manufacture of wine from sugar and the refuse husk or mark of the grape

has been largely practised—insomuch that a great part of the wine of France and Germany has ceased to be the juice of the grape at all. In point of fact, the processes of blending, softening, fortifying, sweetening, plastering, &c., &c., are carried on to such an extent, that it is hardly possible to obtain a sample of genuine wine, even at first hand; and books are written on the subject, in which the plainest directions are given for the fabrication of every kind of wine, there being druggists, called 'brewers' druggists,' who supply the agents of adulteration. These are as follow:—Elder-berry, logwood, Brazil-wood, red saunders'-wood, cudbear, red beetroot, &c., for colour; litharge, lime or carbonate of lime, carbonate of soda, and carbonate of potash, to correct acidity; catechu, logwood, sloe leaves, and oak bark, for astringency; sulphate of lime, gypsum, or Spanish earth, and alum, for removing colour; cane sugar for giving sweetness and body; glucose or starch sugar, for artificial wine; alcohol for fortifying; and ether, especially acetic ether, for giving bouquet and flavour. The tests for these agents are not readily applied, except by the professional chemist; but they are promptly recognised by the stomach and the brain; for good wine, though it may intoxicate, rarely leaves a disagreeable impression" (p. 173).

"The adulteration of spirits consists mostly in the addition of water, and in the use of inferior spirits, recipes being given in the *Publican's Guide*, and other such books, for what is called making up spirits for

sale. The recognition of these frauds rests with the Excise, under the Act 35 & 36 Vict., c. 94" (p. 174).

Dr. Richardson, in the fifth of his Cantor Lectures, after stating that "many wines and spirits are charged with that heavier alcohol, the amylic," and that "effervescing liquids sold under the name of wines are invited to complete their fermentation in that sensitive bottle, the human stomach," proceeds to deal with yet more serious forms of adulteration. He says,—

"The admitted addition of some actively poisonous substances to alcoholic drinks, in order to produce a new luxury, is an evil more disastrous than those named above. The drink sold under the name of absinthe is peculiarly formidable. In this liquor, about five drachms of the essence of absinthum or wormwood is added to one hundred quarts of alcohol. Thus the liquor is not only very strong as a mere alcoholic drink, but it is charged with another agent, which has been discovered to exert the most powerful and dangerous action upon the nervous functions. The essence of absinthum, in doses of from thirty to fifty grains, produces on dogs and rabbits signs of extreme terror and trembling, followed by stupor and insensibility. In larger doses it causes epileptiform convulsions, foaming at the mouth, and stertor of the breathing. Its effects, as they occur from the taking of it in man, have been most ably described to me by one who has taken it until it induced in him the peculiar epileptiform seizure. He described the effects

as resembling those produced by haschish, the narcotic of the East, which has been known for so many ages as the nepenthus of Homer, and which owes its properties to extract of Indian hemp or cannabis Indica. The partial insensibility caused by the absinthe is attended with the ideal existence of long intervals of time, in which the events of a whole life are arranged and appreciated, to be succeeded by terrific hallucinations and intellectual weakness, ending in an unconscious struggling, as if for life. In time, if the use of the absinthe be continued, these phenomena become permanently established, and the result of them is inevitably fatal.

"The doubly poisonous absinthe is made the more seductive to its victims by the fact that it excites a morbid craving for food, which is never felt except when it is tempted by the destroying agent. Indeed, such are the terrible consequences incident to this agent, that I agree with Dr. Decaisne in maintaining that it ought, by legal provision, to be forbidden in all civilised communities as an article for human consumption. Even in small quantities taken daily, say one or two wineglassfuls, it causes quickly a permanent dyspepsia, and, what is of still more consequence, it tempts its victims on and on, so that they cannot take food until absinthe has prompted the desire for it, by which time they are hopelessly and mortally in its power.

"Until recently absinthe has not been publicly offered for sale in this country on a large scale. But

now, unhappily, the poison is openly announced even here, and the consumption is on the increase. I am doing, therefore, a public duty in denouncing the practice solemnly from this platform, whence so much that is useful to society has for a century past been spoken.

"The intentional additions of poisonous agents to the alcohol of ales, wines, and spirits, pale when absinthe appears in sight, but they are not to be ignored. It is true that we very often hear accounts of the effects for evil of bad wine, when, in fact, the evil is truly due to the excess of ordinary alcohol that has been taken by the complainant. At the same time it is not to be denied that there exists in our midst a system of mixing, compounding, blending, and reducing wines and spirits which, carried to artistic perfection, is additionally prejudicial to the business of selling the various alcoholic beverages.

"To be just to our own age, this artistic performance is not an invention of it. The adulteration of wine is one of the oldest devices, extending from the Greeks and Romans onwards to this day. In the Middle Ages many prohibitory Acts were passed against it by various Governments. As late as the close of the seventeenth century an Act was passed by Duke Everhard Louis of Wurtemburg, making it an offence punishable with death and confiscation of property to adulterate wine with bismuth, sulphur, or the salt of lead, called litharge, now known as the yellow protoxide of lead. In the year 1705-6, John Jacob

Ernhi, of Eslingen, was actually beheaded for carrying out adulteration with the forbidden poisonous lead compound."

We are all familiar with the exclamation of Falstaff over the gypsum or sulphate of lime adulteration practised in his day, as it had been in Greek and Roman times:—

"You rogue, here's lime in this sack: there is nothing but roguery to be found in villainous man; yet a coward is worse than a cup of sack with lime in it, a villainous coward."

Dr. Richardson, speaking from his professional experience, thinks the adulterations usual in ales the least hurtful. Of the stronger ales and stouts he thinks alcohol the arch-adulterator. He says,—

"The stronger ales and stouts are injurious mainly from the alcohol they contain. Those which have not ceased fermenting, and from which gas is escaping, produce a persistent dyspepsia, attended with flatulency and painful distension of the body. This leads in time to permanent enlargement or dilatation of the stomach, and to loss of proper muscular power of the stomach, by which deficiency the trituration of food is impeded and rendered imperfect, at the same time the action of the gastric fluids upon the food is made less effective. There is at the present time in the market a substance used as an addition to ales, which is called *saccharina*. It is sold in the form of the ordinary sugar loaf, and the cost of it is about £97 a ton. It is made by the action of diluted sulphuric acid upon

starchy matter, and it is in fact a grape sugar. It gives to the ale body and sweetness. It is in itself a fattening food, and it is the same as that form of sugar which is found in the system in diabetes, and which produces the symptoms of that disease; it is not taken in quantity without some indirect risk of danger."

On the adulteration of wines he speaks as follows:—

"The evils arising from wines, apart from those which are due to the natural ethylic alcohol they should contain, are derived from several sources. The wine that has not ceased to ferment, but when uncorked is found to be charged with gas, is often as injurious as beer in which the fermentation has not terminated. Such wine produces a fermentation within the body, and gives rise to those phenomena of dyspepsia to which allusion has already been made. Wine that has once been acid, and has been treated with lime, in order that the acidity may be neutralised, is open to the objection of an excess of salts of lime. It has been urged against wines treated in this manner that they lead to calculus disease when they are taken in quantity for long periods. I must answer to this suggestion, that I have not had experience of the slightest evidence that would support it, nor do I think there is sufficient of such wine consumed to warrant any conclusion of the kind. Wine adulterated with fusel oil or amylic alcohol is unquestionably dangerous, owing to those physiological effects produced by the adulterant to which I specially directed your attention in the second lecture of this

course. Wines that are headed are injurious, owing to the foreign mixture for heading that has been added to them, and which I shall describe in due course.

"Some substances that form in natural wines exert an effect on the animal body when they are taken into it. These substances are principally aldehyde and acetic acid. Aldehyde, when it is present in wine, communicates to it a natural bouquet. You will find on the table a pure specimen of aldehyde, and you will also find specimens of natural wines, kindly lent to me by Mr. Denman, in which this change of alcohol by oxidation has taken place. In the year 1848, the late Sir James Simpson, of Edinburgh, discovered that aldehyde would produce anæsthetic sleep when its vapour was inhaled, and I have since submitted it to experiment with the view of testing its action on the living body. I find it is a rapidly intoxicating agent, sharp to the nerves of sense, and acting with greater rapidity than alcohol, and with a less prolonged effect, for it is as soluble in water, and it is so volatile that it boils at 70° Fahr. It is, therefore, quickly diffused and quickly eliminated.

"The action of aldehyde upon the living body has been, as yet, insufficiently studied. It has a close relation to the narcotic action of alcohol, and the symptoms it produces are so similar, I am inclined to believe that the narcotism which follows the administration of alcoholic spirit is due to its production.

"The presence in wines of free acetic acid is, on the whole, not injurious, if the wine in other respects be free of adulteration. The tendency of this acid itself is to promote the digestion of albuminous foods, and I have sometimes observed, in persons whose digestive power is feeble, signs of improvement under its use. In saying this I do not, however, wish to convey that, therefore, a rough acid wine should be taken for indigestion; for the acid in such instances may be administered without the wine, and perhaps with greater advantage. I only wish to record that acidity of a wine in which fermentation has ceased is not a source of additional injury.

"The astringent acid, tannic, of some wines has been advanced as useful in the cases of certain persons who suffer from laxity of body, and who require astringent remedies. It would be wrong to dispute that there is in some wines a virtue of this kind, but it is not peculiar to wine. It can be secured when it is wanted without wine at all, and in a more certain way. This remark holds equally good to what may be favourably spoken of the saline substances which some wines naturally present. I mean to say that the saline constituents can be administered with more certain, and therefore with better effect, independently of wine."

He comes to the adulteration of spirits, a process, it would appear, of great skill and elaboration :—

"Into the different spirits commonly sold, several substances are introduced which exert more or less of

baneful influence on the body that receives them. The addition of fusel oil or amylic alcohol has been already condemned, and need not again be mentioned; and I omit intentionally, for the sake of brevity, a great number of other added substances which do not seem to me to be active for evil, though they were possibly better left out of the animal organism. After these are withdrawn there remain many other agents, which cannot fairly be omitted from our consideration. These are oil of juniper and oil of bitter almonds, potassa, alum, nitric acid, oil of vitriol or sulphuric acid, and butyric acid.

"In even small quantities every one of these agents is injurious to the body, if they be taken for any long-continued period of time. The oil of juniper is an active diuretic, and thereby is injurious to the secreting of one of the most important of the vital organs. The oil of bitter almonds contains cyanogen, the active principle of hydrocyanic acid or prussic acid, and exerts in small and often repeated quantities a prejudicial influence on the nervous functions. Potassa causes a direct, dry, and caustic action upon the nervous membrane of the mouth, throat, and stomach, for the production of which action it is actually added systematically, that it may give the peculiar sharpness called biting the palate.

"Alum is a powerful astringent, producing constipation, and sustaining persistent dyspepsia so long as it is being swallowed; nitric acid is an astringent, exerting also a physiological action on the liver; sul-

phuric acid is an astringent, and butyric acid, as I have found in an original research which I once conducted with it, causes a congested and even inflammatory condition of the whole tract of the mucous membrane.

"Thus each one of these agents communicated to the alcoholic drinks adds to the evils that are likely to arise from the alcohol itself. Let us admit that the added evils are small, nay, I had nearly said, infinitesimal, when considered by the measurement of one administration. But who can measure by that standard?

"When once the taste for one of these unnatural substances is acquired it grows by what it feeds on, and that which was infinitesimal at the beginning becomes, after long continuance, a serious charge for the body to bear daily.

"The spirit in common use that is most subjected to the chemicals I have named is gin. Gin has to be made cordial, to be sweetened, to be rendered creamy and smooth, to be flavoured, to be made biting to the palate, to be beaded, and what not else.

"To be made 'cordial' it must be charged with oil of juniper, with essence of angelica, with oil of bitter almonds, with oil of coriander, and with oil of carraway. To sweeten it, it must be treated with oil of vitriol, oil of almonds, oil of juniper, spirits of wine, and loaf sugar; to force down the same it must be further treated with a solution of alum and carbonate of potassa. To be rendered creamy and smooth it

must be sweetened with sugar, and lightly charged with a small quantity of garlic—Canadian balsam or Strasburg turpentine. To give it piquancy it must have digested in it shreds of horseradish. To be made biting to the palate it must receive that touch of caustic potash of which I have spoken.

"As you see the habituated gin drinker partaking of his favourite drink, you observe often that he enjoys it the more if it be what he calls 'pearly' or 'beaded.' He holds up the precious liquid in his glass, and as he sees the oily fluid in beads rolling down the side, leaving each a creamy train behind it, he rejoices in his treasure. It is *creme de la creme* of gin. Those wicked pearly drops are, to his flushed eyes, the proofs of the purity and excellence of what he would probably tell you was, without mistake, the genuine article. The genuineness consists in the fact that our enthusiastic friend's gin has been beaded by the addition of the following artistic mixture:—An ounce of oil of sweet almonds has been added to an ounce of oil of vitriol. These have been rubbed together in a mortar with two ounces of loaf sugar until a paste has been formed. The paste has next been dissolved in spirit of wine until a thin liquid has been produced, and this, added to one hundred gallons of the gin, has given the fine pearly head that is so much admired."

It is interesting in such inquiries to get behind the scenes, and converse with friends in council:—

"Redding, in his history and description of modern

wines, narrated in his day the many recipes that were openly published in the then existing publishers' guides and licensed victuallers' directories, for the artificial manufacturing of wines and for modifying spirituous liquors.

"I have gone for my information to a similar work of the present day, called the *New Mixing and Reducing Book*, which is, I understand, one of the handbooks of the retailer; the same to him as the "Pharmacopœia" is to the druggist, and to be followed in all its varied arts as implicitly. I cannot leave this without making from it a quotation that bears directly on the health of the poorer classes who indulge in gin. Our authority thus speaks:—

"'Gin, it may be observed, is, of all the spirits ordinarily kept by a publican, the one which, when cleverly managed, yields him the greatest and securest profit. The reason of this is, that there is hardly any definite selling strength for gin, especially if it be sweetened. Within very wide limits no complaint is made by customers on the score of weakness, provided only the gin is creamy, palatable, and sharp-tasted. But the slightest taint or the slightest fault of colour, or a sensible difference from the usual flavour, will lead to dissatisfaction and loss of custom. Strong or unsweetened gin is in comparatively little request, and then, with few exceptions only, amongst the respectable or moneyed classes. At least three-fourths of the spirit sold over the counter of a public-house consists of sweetened or made-up gin; and as the

sugar greatly alters the character of the liquor and deadens the original strength, it is possible for the retailer to consult his own interests by a liberal addition of water, without in any degree exciting the disapprobation or injuring the health of those who patronise his establishment. As a tolerably safe general rule, there will be no occasion to fear dissatisfaction when sweetened gin is not brought below thirty-five or even forty per cent. under proof. It is then nearly five times as strong as old ale. Much more is thought of a pleasant, warming, aromatic taste or smack than of simple alcoholic strength. But as the most careful man may sometimes overshoot the mark in reducing, it is advisable to know how to restore the requisite degree of pungency and sharpness without having recourse to the use of so expensive an agent as spirits of wine. Supposing, then, that by accident the strength of a barrel of gin has been lowered rather too far, a good and cheap remedy is the following:—For 100 gallons—1 ounce cassia nails, ½ ounce chilies. Steep for a week in a pint of spirits of wine, then mix well with the gin.'"

It is unnecessary on this point to say more. Those who wish to trace further the subtle and complex art of vinous sophistication, and to sound the depths of adulterative deceit in the matter of alcoholic drinks generally, will find endless scope in the chief writers on wines, and yet more in the manuals of *Drink Doctories*, printed for the use of manipulating brewers and vintners. On this, as in all departments of the

temperance question, information alike sententious and complete will be found in that valuable compilation, *The Temperance Cyclopædia*, by the Rev. Dr. William Reid of Edinburgh.

The moral is, with a verbal change, "Look before you leap." Leaping is an operation sufficiently critical to require the aid of clear vision, as otherwise the result may be a broken leg or a broken neck. But drinking is no less entitled to the same accompaniment, if we would escape the peril of broken health or shortened lives. When the leap is taken, gravitation will hold you committed to the consequences, without any power to resile; and when you drink, the effects will begin to develop themselves directly, even if the doctor and the stomach-pump should be within reasonable hail. There is every reason then why in drinking, as truly as in leaping, and in some respects with much more emphasis, we should use our utmost circumspection, and make sure what we are about.

Some things, like the pure light of heaven, are too good for adulteration; and other things are already too bad to be made very much worse by the process. Such a thing is alcohol. It is itself its own worst adulteration. Let the indulger, then, bethink him, moderate or immoderate, whether he is on safe and rational ground at all in treating himself to his "little drop," and whether he had not better embark at once on the pure limpid waters of total abstinence.

CHAPTER III.

EARLIER INVESTIGATIONS.

1. *Opening Quarter of the Century.*

PRACTICALLY and properly temperance physiology is coeval with the temperance reformation in these realms, both falling within the limits of the last half century. Not that either was the cause of the other, but by one of those providential coincidences and pre-established harmonies of which all history is full, they sprung up together to combine and reciprocate their distinctive forces. In the years preceding we here and there find ground broken to good purpose by zealous inquirers. Early in the century interesting experiments were made, and some important results anticipated, by Doctors Fyfe and Prout of Aberdeen. About the same time a valuable contribution was made by Dr. Rush of Philadelphia, who, under the promptings of Christian benevolence, much more than even of scientific, published his *Inquiry into the Effects of Spirituous Liquors*, and, in 1811, presented the General Assembly of the Presbyterian Church with a thousand copies when it was in session in that city. The impression thereby produced may be traced in the hold the movement in America has all along taken on ministers; and loud echoes of it are perceptible in the famous "Six Sermons" of Dr. Lyman Beecher, which lent such propulsion to the earlier fortunes of the

movement. Lurid glimpses, of course, are incidentally opened up to us from time to time by chemists and physiologists, when their path of inquiry chances to conduct them through alcohol's blasted heath.* Little else, however, occurs between the old belauders of alcohol as *aqua vitæ*, or water of life, in whose eyes its brief exhilarative flush redeemed all, down to forty years ago, when, by a sturdy disenchantment at the hands both of science and of philanthropy, alcohol began to be unmasked as a convicted *aqua mortis*, or beverage of death, to the gaze of an astonished and long incredulous public.

The reciprocal influence of the temperance movement and temperance physiology is strikingly illustrated by facts of which some are well known, others are not known at all, while all deserve greater prominence and appreciation than they have ever yet received.

To give an illustration or two: the distinctive temperance movement, in its baby costume of Moderation, was first introduced into Great Britain by the late John Dunlop of Greenock, in 1829. Dr. James Kirk, then in his early prime, an intellectual, energetic, and singularly enthusiastic man, was in full career as a physician in that town. He threw himself heartily into the movement, and some of the preliminary meetings connected with its inauguration were held in his house. He spoke, along with Mr. Dunlop, at public

* *e.g.*, Courten (1679), Beddoe's *Hygeia* (1802), Sir B. Brodie (*Philosophical Transactions*, 1811), and Flourens' (*Recherches sur les Fonctions du Système Nerveux*, 1824).

meetings in Greenock, Glasgow, and other towns, and expounded the scientific bearings of the subject in lectures, for which he had excellent aptitudes. In the year following, 1830, in an address to the Vale of Leven Temperance Society, he thus detailed the results of a *post mortem* examination:—"I dissected a man who died in a state of intoxication after a debauch. The operation was performed a few hours after death. In two of the cavities of the brain, the lateral ventricles, was found the usual quantity of limpid fluid. When we smelled it, the odour of the whisky was distinctly perceptible; and when we applied the candle to a portion in a spoon, it actually burned blue—the lambent blue flame, characteristic of the poison, playing on the surface of the spoon for some seconds."* Some doubts having been expressed in regard to these and other cases of alcohol being detected in the brain, Dr. Ogston, of Aberdeen, said at the time,—"I am happy to be able to add one case to their number. The body of a woman, aged forty, of the name of Cattie, who was believed to have drowned herself in a state of intoxication, was found on the 23rd of August, 1831, in the Aberdeenshire Canal. In company with another medical man,

* It has sometimes been asked how a professional man of such eminent ability and zeal so suddenly disappeared. The answer is painful. Incessant work, all done by him as an enthusiast—above all, his ardour at the cholera visitation of 1832, with its too common reward of popular persecution—broke him suddenly down. He outlived his apoplectic fit twenty years, most of them spent in Glasgow, but in the form of a prematurely old, bent, and thoroughly wrecked man.

I was requested to examine the body, in order to report the cause of death, no one having witnessed the act. We discovered nearly four ounces of fluid in the ventricles, having all the physical qualities of alcohol, as proved by the united testimony of two other medical men, who saw the body opened, and examined the fluid."

These startling phenomena pioneered and suggested the remarkable contribution to temperance physiology made a few years later by Dr. Percy, of Nottingham. Before adverting to this, however, the order of time makes it fitting to introduce here the well-known case of the Canadian who got daylight driven into his stomach by an accident, and which was admirably turned to account in the interests of alcoholic investigation. It is one of the oddest cases on record—a case perfectly unique, for it never occurred before, and is never likely to occur again.

2. *Alexis St. Martin and his Perforated Stomach.*

Some two years prior to the formation of the American Temperance Society, in 1826, this Canadian, Alexis St. Martin by name, received a gunshot wound, which left an opening into his stomach of two and a half inches in circumference. The wound never closed, though nature developed a valve to keep the food from getting out. Dr. Beaumont, an American physician, on hearing of it, seized the golden opportunity, and engaged St. Martin for many months for experimenta-

tion; using that aperture, both as a door by which to introduce substances into the stomach, and as a window through which to look in and examine effects. The results, to which I can only summarily refer, on the observed action of alcohol on the walls of the stomach were not less important than they were unprecedented. They were published under the title, "Experiments and Observations on the Gastric Juice and the Physiology of Digestion: By William Beaumont, M.D., Surgeon in the United States Army, Plattsburg, 1833." This, it is interesting to note—by a providential coincidence, by no means rare in the history of great movements—was the very year in which the temperance reformation, shortly before introduced into these kingdoms from America, was reconstructed on the solid basis of total abstinence; and these and other facts were of great value in furthering its triumphs.

The changes observed in St. Martin's stomach under the action of alcohol were the more distinct and pronounced that he was a man habitually temperate. Had prior habits of intemperance produced their usual congestive effects on that central organ, the experimental results would have been less marked. As it was, their distinctness and significance may be judged by the following description of what revealed itself in his inner man after a few days of free indulgence in spirits:—

"The inner membrane of the stomach was unusually morbid, the erythematic (inflammatory) appearance more extensive, the spots more livid than usual, from

the surface of some of them exuded small drops of grumous blood, the aphthous (ulcerous) patches were larger and more numerous, the mucous covering thicker than common, and the gastric sensations much more vitiated. The gastric fluids extracted were mixed with a large proportion of thick ropy mucus, and a considerable muco-purulent discharge, slightly tinged with blood, resembling the discharge from the bowels in some cases of dysentery. Notwithstanding this diseased appearance of the stomach, no very essential aberration of its functions was manifested. St. Martin complained of no symptoms indicating any general derangement of the system, except an uneasy sensation and a tenderness of the pit of the stomach, and some vertigo, with dimness and yellowness of vision, on stooping down and rising again; had a thin yellowish-brown coat on his tongue, and his countenance was rather sallow, pulse uniform and regular, appetite good, rests quietly, and sleeps as usual."*

Thus, what science and experience had antecedently indicated, and that with no lack of emphasis, Dr. Beaumont was able, by means of his Canadian, to establish on the evidence of sense. Scientific faith became sight. The results were the more important, as proving that serious injury might be inflicted by alcohol, and yet sensation all the while give little or no sign.

But of all his deductions, one of the most practically valuable and seasonable, especially in these palmy days

* p. 237.

of moderation, was the generalisation that the whole class of alcoholic liquors, whether simply fermented or distilled, may be considered as narcotics, producing very little difference in their ultimate effects on the system."* With reference to the above cited description, he adds: "The free use of ardent spirits, wines, beer, or any intoxicating liquor, when continued for some days, has invariably produced these morbid changes."†

This conclusion is identical with what was reached thirty years after by M. M. Lallemand and his fellow investigators, who found, as we shall shortly see, that all alcoholic fluids, however otherwise they may differ in taste, colour, or composition, produce, *cæteris paribus*, the self-same effects in proportion to the quantity of alcohol they contain. This articulate testimony of Dr. Beaumont was of itself enough to knock the pedestal from under the old moderation method, which already had been weighed in the balance of experience and found wanting, and was now tottering to its fall; and it appeared in good time to contribute to the establishment of the new and better method of total abstinence on the adamantine basis of scientific truth.

3. *Dr. Percy's Experiments.*

It was in 1833 that the temperance movement was reconstructed on the solid basis of total abstinence. It was in that same year, 1833, that Dr. Beaumont's

* p. 50. † p. 239.

Experiments and Observations first saw the light. Six years later appeared a contribution to temperance physiology, as valuable as it was unique, which forms an epoch in the study, and whose results, after a semi-burial of twenty years, found in 1860 a triumphant resurrection. I refer to Dr. Percy's essay, the drift and history of which are thus stated in its title, "An Experimental Inquiry concerning the Presence of Alcohol in the Ventricles of the Brain, after Poisoning by that Liquid; with Experiments illustrative of the Physiological Action of Alcohol; for which a Gold Medal was awarded by the Medical Faculty of the University of Edinburgh: By John Percy, M.D. Nottingham, 1839." By distilling blood, alcoholised through the stomach, he obtained a fluid which proved itself to be alcohol, by dissolving camphor and burning with a blue flame. He found it in yet larger proportion in the brain, from which he inferred that a "kind of affinity existed between alcohol and the cerebral matter." He ascertained the "remarkable rapidity with which alcohol may, under favourable circumstances, be absorbed from the stomach, and conveyed to the brain," and "the great facility with which it may be separated from the bile and liver," and also from the kidney excretions. One of his experiments on a dog clearly "illustrated the intensely irritant action of alcohol," the stomach showing "the most intense inflammation." Another strikingly proved its power to kill by shock—"a full-grown spaniel" having succumbed "before the injection of less than two and

a half ounces of alcohol into the stomach was completed." He adds, "Never did I see every spark of vitality more effectually and more instantaneously extinguished." The emptiness of the stomach had hastened the result. "On opening the chest, a decidedly alcoholic smell was perceived," proving that, in the course of two minutes, the alcohol, besides leaving its full proportion in the brain, must have passed into the circulation," where it was found in abundant quantity.

These were startling results. The medical faculty in due time frankly accepted them, as the following testimonies from two of our leading toxicologists will show. Speaking of the question much debated in those years, as to whether alcohol and other poisons act by direct sympathy along the nerves, or through absorption into the circulation, Sir Robert Christison says, "The presumption in favour of the absorption of alcohol, and the possibility of detecting it throughout the animal system, has been turned to certainty by the late experimental researches of Dr. Percy." He then describes some of these, and adds, "Dr. Percy gave me an opportunity of verifying his results with the brain of the man (one who had died after drinking a bottle of rum), and I had no difficulty in obtaining from a few ounces of brain a sufficiency of spirit to exhibit its combustion on asbestos repeatedly."* His fellow-toxicologist, Dr. Taylor, says, "The absorption, deposition, and elimination of alcohol were established many years

* *On Poisons*, 4th ed., p. 961.

since by the experiments of Dr. John Percy," to some of which he refers, and then adds, that they completely settled "a difficulty which had been raised respecting the action of poisons by absorption." He says: "But for the discovery of alcohol in the blood and brain, this is precisely a case in which death would have been set down to sympathy. Elimination appears to be very rapid. It takes place chiefly by the lungs, a fact indicated by the odour of the breath in men and animals." Higher authorities on poisons could not be cited, and their concurrent testimony proves that Dr. Percy's conclusions had established their place as accepted scientific facts prior to the Parisian Experiments of 1860.

We take leave of these interesting investigations by citing the following from Dr. Lees:—

"The experiments of Dr. Percy have revealed a most startling fact.

"'A remark,' says he, 'may be appropriately introduced respecting the situation in which the alcohol may exist in the brain. That, to a certain extent, it is diffused through the substance of the brain, and that it is not all contained in the cerebral vessels, will, I think, appear from the following circumstance,—namely, that, although I have subjected to analysis a much greater quantity of blood than can possibly be present within the cranium, yet *I have, in general, been enabled to procure a much larger proportion of alcohol from the brain* than from all this quantity of blood. Indeed, it would almost seem that a kind of

affinity existed between alcohol and the cerebral matter.'

"Now, asks Professor Otto, 'What part of the brain, and what class of cerebral organs, does the stimulus of alcohol most strongly affect?'

"'*The greater part of the exciting influence of alcohol is directed towards the posterior and inferior portions of the brain;* in other words, IT EXCITES CHIEFLY THE ORGANS OF THE ANIMAL PROPENSITIES. Hence, according to the law that whatever *stimulates strongly* one class of cerebral organs *weakens another;* while alcohol is imparting fresh vigour to the propensities, it is enfeebling the intellect and moral feelings.' (*Zeitschrift fur Phrenologie*, No. ix. Heidelberg, 1845.)

"With such statements before us, we can be at no loss to account for the fact, that alcoholic liquors, even in limited quantities, tend, on the one hand, to stir up sensuality, inflame passion, and excite lust, and, on the other, to dry up and destroy the finer sensibilities and nobler faculties of the soul." *

4. *The Advanced Truths Maintained.*

It forms no part of our present plan to take note of all, even of the really important contributions to temperance physiology in those earlier years, in which, both practically and theoretically, the great temperance reformation was energetically making its way. But one or two well-known names demand of us a

* *Physiol. Hist. of Alcohol*, 1846, p. 54.

passing meed of specially grateful recognition. Dr. Grindrod's singularly learned and exhaustive prize essay, *Bacchus*, produced a profound and wide-spread impression at that youth-period of the movement, and still stands unsurpassed as a storehouse of miscellaneous temperance argument and illustration which, as might be expected, is specially rich and copious on the chemical and physiological aspects of the question. A new edition of this work, finally corrected by the author, and furnished with a very ample index, was published in 1851. In this essay, whatever had previously been done in the way of alcoholic investigation, is duly chronicled and expounded, with much original elucidation by the author himself; and, considering the vast strides that have lately been made in the determination of the true character and workings of alcohol, it is interesting to note the comparative maturity of those earlier views, and to what extent they anticipated more recent results. Another prize essay of great authority and value was that of Professor Carpenter, entitled *The Physiology of Temperance*, which treated the workings of alcohol in the system with the ease and mastery to be expected of one of the very foremost of physiologists, and who superadded a copious array of illustrative argument, from arctic, tropic, and other experience, in which he stamps his scientific principles with the broad arrow of established fact. Kindred in its purpose and scope is the singularly spirited little work that appeared more recently from the pen of the late Professor Miller,

entitled *Alcohol, its Place and Power*, a work as racy and popular in its style as it is morally earnest and scientifically authoritative.

But, reverting to that earlier period, it is interesting to observe with what promptitude those early results of alcoholic inquiry, while to some extent appreciated by medical science, were eagerly caught up by young teetotalism, and their principles inhaled as the very breath of its nostrils. In this way some young and ardent natures, who had given themselves to the movement, were fired at the outset into a physiological ardour which has sustained itself over life-long careers, and ripened, in some cases, into truly noble results. One foreground figure in the arena of temperance chemistry and physiology—not to name his equally devoted and exhaustive labours in the Biblical departments of the question—here stands forth, as in many important and rare respects, more noteworthy and historical than most to be found in the same field; one who combines in his single person the several faculties, seldom found united in so high a degree, of scientific investigation, acute argumentation, and popular elucidation; one who, for mastery of chemical and physiological fact, and prompt seizure of every new truth, and sustained tension in the van, and life-long devotion in the cause, stands pre-eminent among explorers in this field of long-hidden treasure—I mean Dr. Frederic Richard Lees. His works, though not as a whole distinguished by any *lucidus ordo* of arrangement,

present the rare and interesting feature of steady growth up to the last reached limits, throughout all the years of their successive publication. They have accumulated, treatise after treatise, volume after volume, born and cradled, in many instances, in the whirlwind of the temperance conflict; but in others, including the larger and more ambitious of his works, duly elaborated in the seclusion needful for the thought and research they evince. To us the minor treatises of Dr. Lees, aggregated by the occasion, have an organic unity and value of much interest, as indicating the progress and development of the physiology of temperance. Nowhere else will it be found at once so fully and so faithfully mirrored; and this feature will be found to have rare and peculiar interest to any competent historian that may arise, of the temperance reformation.

Considering that Dr. Percy's conclusions had established their place as accepted scientific facts as early as 1839, it has often been matter of surprise that results so important should, among his own profession, have been so apathetically received. During the twenty years that elapsed between Percy and Perrin, they were passively shelved, hardly any of the faculty caring to follow them up. This task of interpreting their significance and pointing their moral was left to the cultured class of temperance advocates, who ably and nobly fulfilled it. But, while supported by many able and effective co-adjutors, the Ajax in this work was pre-eminently Dr. Lees.

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By lectures, by publications, in scientific discussion, in popular discourse, he and others like-minded disseminated the physiological truths of temperance, in so far as these had been determined, and, of course, not without remains of error, broad-cast over the land. That alcohol was a poison the boldest could not deny. Such names as those of Orfila and his distinguished pupil Christison, of Dunglisson, Taylor, and every eminent toxicologist—as we shall yet briefly show—had for ever settled that. But this steady jet of scientific light, and the other results above detailed, the medical profession had practically, to a great extent, put under a bushel. And yet of all the scientific truths in the professional creed, these were the very last to be shelved off as purely speculative, for they were at once the most undoubted and the most intensely practical of all. Under the tyranny of custom, in the sacred name of hospitality, this insidious fluid, produced under every pretext, flavoured to every palate, coloured to every eye, and exhibited in every costume, light or heavy, red, white, or black; on every occasion, at church or mart, at births, at deaths, and all between,—

> "In joyances and high tides,
> In weeping and in woe,"

was shedding its "leprous distilment" throughout society, percolating into all its strata, saturating it to the core; and yet, instead of uplifting their voices like a trumpet, and sending notes of warning on

every wind, it was too long the fashion of medical men to commend it, not as an occasional medicine—for which no one could have blamed them—but as a habitual tonic, or even salubrious beverage. We, of course, frankly concede to them that they acted up to their realised measure of faith and light.

What medical science, the recognised and qualified custodier of the national health, at that time failed to do, teetotal advocacy did. Despised but indomitable, because true to itself and its high purpose, in its own self-taught intelligence, and with a direct practical aim, it caught up the scattered leaves of truth which the Sybil of medical science had produced and then thrown to the winds, and arrayed, expounded, and enforced them according to the light that was in it, to the drink-deluded million, declaring that whatever new truths science had in store for us, this at least stood revealed by it as in the light of seven suns,—that alcohol was a confessed poison, and that as a poison the human system dealt by it, and sought, with an emphasis too significant to be mistaken, to expel it, if taken in, and even to repel it at the threshold.

5. *Liebig and the Chemical Period.*

Proverbial is the sentiment that the discoveries of to-day become the commonplaces of to-morrow; yet it is a remark to be received with many qualifications. While some new truths mount at once into the ascendant, and diffuse themselves with triumphant rapidity,

others, after emerging into the light, retire again into obscurity, or become long eclipsed under showy theories and dominant names.

This has found signal illustration in the history of temperance physiology; and, considering that new generations of abstainers are ever rising up that know not, or know but dimly, as half mythical personages, the painfully investigating Josephs of an earlier date, it becomes important to recall the lights and shades that variegated the earlier fortunes of temperance physiology.

Dr. Percy's results of 1839 had not given forth their light long till they suffered eclipse, under the gigantic shadow of a great scientific name. What has been termed "the Chemical Epoch"* of alcoholic investigation opened in 1843, by the appearance of Liebig's remarkable work on *Animal Chemistry*, and of his *Letters on Chemistry* shortly after. The charming simplicity, originality, and quiet masterfulness of these works fell on the public like a fascination. Well do we remember the new and strange spell that came over us in perusing them as they successively appeared. Professor Gregory of Edinburgh, the editor, declared in his preface to the first of these publications, that with it we had "entered on the true path of discovery." This in the general view none will deny.

The Liebigian doctrines, fundamentally considered, commend themselves by their self-luminous simplicity. They, of course, leave confessedly unbridged the gulf

* *Meliora*, vol. iv, p. 40.

between matter and mind. "We know exactly the mechanism of the eye; but neither anatomy nor chemistry will ever explain how the rays of light act on consciousness, so as to produce vision."* "In the animal body we recognise as the ultimate cause of all force only one cause, the chemical action which the elements of the food and the oxygen of the air mutually exercise on each other. The only *known* ultimate cause of vital force, either in animals or in plants, is a chemical process."† The rationale of this process is simplicity itself. "At each moment of life, in the animal organism, a continued change of matter, more or less accelerated, is going on; a part of the structure is transformed into unorganised matter, loses its condition of life, and must be again renewed. Physiology has sufficiently decisive grounds for the opinion, that every motion, every manifestation of force, is the result of a transformation of the structure or of its substances; that every conception, every mental affection, is followed by changes in the chemical nature of the secreted fluids; that every thought, every sensation, is accompanied by a change in the composition of the substance of the brain."‡ This waste is repaired by food, the elements of which pass with beautiful simplicity into the tissues. As these contain nitrogen, so must the food that supports them, in addition to its other constituents.

Hence the twofold division of the food into that

* *Animal Chemistry*, 3rd ed., 1846, p. 6.

† Ib., p. 44.

‡ Ib., p. 8.

which forms tissue, and that which produces heat. The first, or flesh-forming varieties of food, are those which contain nitrogenous elements—albumen, fibrine, caseine—to repair the waste throughout all parts of the animal structure. The latter, or heat-forming varieties, consist of carbon, hydrogen, and oxygen, and are supplied by such elements in the food as sugar and fat. These are burned as fuel in the blood for the maintenance of vital heat, or are stored up as a reserve of fuel in the most available spaces in the system. In this combustion in the vital furnace the carbon and hydrogen of the food enter into combination with the oxygen received into the blood, and give out their products in the breath in the form of carbonic acid gas and vapour. Thus "respiration is the falling weight, the bent spring which keeps the clock in motion,"* and its pulsations, like the pendulum, have their due measurable influence.

We can thus certainly determine by chemical analysis whether any given food can minister nutrition. If it has no nitrogen it cannot. But alcohol has none. This, then, settles for ever all the pretended and pretentious claims that have been got up for it to rank as a nutriment, for its only constituents are carbon, hydrogen, and oxygen. To extract from such a substance the "nourishment" which its patrons so often parade its ability to give, is as impossible as to "bring a clean thing out of an unclean."

But if a flesh-forming food it is not, and cannot be,

* Ib., p. 30.

may it not still be a food of the heat-forming kind? Liebig answers that it may. Along with "fat, sugar, gum, &c," he includes "wine, beer, spirits," among "the elements of respiration in our food." But this he does, not on the strength of proof, but theoretically, on purely analogical grounds, and not without serious abatement in regard to its value as a fuel. The best fuel is that which is so amply provided by nature in our various kinds of food, farinaceous as well as animal —especially in the form of fat, whose heating power, says Liebig, is two and a half times that of starch or sugar, and two and two-third times, as he estimates, that of alcohol. Thus 100 parts of oil will generate as much heat as 240 parts of starch, 249 of sugar, and 266 of alcohol.*

* Liebig, after naming these two kinds of food, says of the latter,—"Sugar, starch, and gums may be regarded as pieces of wood transformed, and can be produced from wood. Fat stands next to coal in the quantity of carbon it contains. We heat our bodies as well as our stoves with fuel containing the same elements as wood and coal, but essentially distinguished from them by their solubility into the juices of the body."

He set himself with great zeal to settle the question of equivalents and proportions; but though on this he established important principles, his results, owing to his purely chemical standpoint, needed correction. A sharp contest thereon arose between Giessen and Paris, but other and independent inquiries determined the points in dispute in another manner.

As this is a matter of much interest, we will here introduce one of the greatest of physiologists to tell us the latest results:—

"It was not," says Professor Pettenkoffer, "until experi-

Granting to Liebig then his assumption, the best thing he has to say of alcohol is, that it may, on analogical grounds, be set down as a fuel-food, but one of a very inferior quality. When to this we add that it is positively superfluous, comparatively expensive, and superlatively mischievous, we may safely pronounce the man very foolish who would procure it, or even

ments were undertaken with the respiratory apparatus in the Physiological Institute at Munich, that other views came to be entertained. This apparatus enabled us to ascertain the exact amount of receipts and expenditure in the body during twenty-four hours in the form of gas, which had only been possible before with the fluids and solids; and when an exact balance had been struck, it appeared that, at any rate among the carnivora and man, fat is never produced by the hydro-carbons, not even when taken in the greatest quantity, but that it must be produced by the fat in the food, and by being eliminated from albumen. Voit, by his experiments on a milch cow, has rendered the production of fat by hydro-carbons in the herbivora very doubtful, and we are thus compelled to conclude that all fat, not contained in the food, which is produced in the body, has its origin in the decomposition of albumen, and that the hydro-carbons, previously looked upon as fat-formers, only serve to prevent the fat originating in albumen from combining with oxygen, from further decomposition into carbonic acid and water, from so-called combustion. No single experiment since made has contradicted this theory; indeed, time has only confirmed it. Liebig never could reconcile himself to it—he even disputed it in his last work on fermentation and muscular force; but this does not detract from his great services on the question of alimentation, for even the modern view is but the result of the impetus which he gave to it."—*Contemporary Review*, April, 1877, p. 886.

take a present of it, for any such end. Liebig himself says,—"Alcohol and alcoholic drinks are, from their price, most costly materials of respiration. The same effect could be produced in the body by means of saccharine and farinaceous articles of food, at one-fourth to one-fifth the cost."* Nor does this excess of money represent the whole or main part of the cost. The dupe who pays five prices for his vital coal at alcohol's market, pays the additional and higher price still of impaired comfort and poisoned health. The belauded fuel, instead of warming the body, after a brief deceptive flash, cools it more than before, and then fouls, rusts, and corrodes the stove. It neither fills nature's pot, nor boils her pot. It only rusts her pot, and (in vulgar parlance) "sends all to pot."

A wine and beer bibbing people, however, only too eager to grasp at any plausible scientific sanction for their practice, caught up the new physiological evangel, and heralded it to the four winds as established truth. The charm of Liebig's "Letters" greatly contributed to the effect. In them the Baron admitted that alcoholics "furnish no element capable of entering into the composition of the blood, muscular fibre, or any part which is the seat of the vital principle,"† but he contended that in union with oxygen, and conveyed by the circulation of the blood to every part of the body, "they contributed to supply the source of animal heat;"‡ and all the more that alcohol has so great an

* *Letters on Chemistry*, 4th ed., p. 470.

† *Letters on Chemistry*, 1844, p. 57. ‡ *Animal Chemistry*, p. 147.

affinity for oxygen. But as we use other articles whose elements, although capable of combining with oxygen, yet for particular reasons do not combine with it in our system, so, for aught that theory can tell us, may it be with alcohol. That it verily is so, Dr. Percy's experiments, which brought alcohol unchanged out of the organism, had already fairly demonstrated. And to this falls to be added the negative proof that no trace of the distinctive products of burned alcohol has ever been discovered in the human body.

The science of the day, however, at once accepted the hypothesis as true, and both in England and the Continent shouted, "Great is Diana." It found elaborate exposition some time after in Johnston's *Chemistry of Common Life* (1854), and in an article by G. H. Lewis, in the *Westminster Review* for July, 1855. By this time, however, a host of investigators* were busy, whose results, though of a mixed character, and inconsiderable in detail, were of no small significance as at least proving the vitally depressing action of alcohol, and foreshadowing some of the valuable discoveries of subsequent years.

6. *Protest of Temperance Physiologists.*

In the meantime, against this stiff headwind of oracular theory blowing from those high places of science, the more cultured leaders of the temperance reformation, of whom (with one or two professional

* Vierordt, Schultz, Moleschott, Böcker, Lehman, &c., &c.

exceptions, especially Professor W. B. Carpenter) Dr. Lees was the foremost scientific champion, held firm to the already established facts, that alcohol was a poison, and that the human organism appeared in the whole to meet it as such, and exert itself to the utmost to expel it unchanged.

Nevertheless, they did admit the combustion of part of the alcohol in the blood, but maintained that this meant the substitution of bad fuel for good. Even as fuel, alcohol was bad, preventing the oxidation of the more natural fuel in the blood, while in other respects it was demonstrably pernicious. Thus far they kept to the lines of Liebig. Dr. Carpenter, in his prize essay (*The Physiology of Total Abstinence*), copiously illustrates this effect by that of straw put on the top of a fire in dulling the process of combustion underneath. In a discussion very ably conducted on both sides, between Dr. Henry Browne of Manchester and Dr. F. R. Lees, in 1858, the former, though in some degree the champion of alcohol, appears at times to strike *certain* more recently established results more nearly than the latter. To illustrate the transition of sentiment as indicated by two minds acquainted with its latest forms, we will here introduce an extract from both. Dr. Browne says:—

"Few doctrines have been more generally taken for granted than that alcohol is burnt in the blood, becoming wholly carbonic acid and water, just as when burnt in a lamp; but facts and authority are not all on one side even here.

"The temperature of the body falls for some hours after taking wine, and the carbonic acid of the respired air is diminished. The alcohol here must be like the dog in the manger, and neither consume nor let consume. In *A Short and Easy Method with the Teetotalers* (p. 153), there is an amusing appeal to the experience of a lover of whisky, in proof of the chilliness caused by alcohol. Of the Scotch drover and shepherd the writer says: 'Though exposed all day to the air, and even though he feel the cold, he should avoid drinking spirits, which only produce temporary warmth (of sensation), and for a long time afterwards induce chilliness and languor. Much rather let him reserve the allowance of spirits he gives himself until the evening, when he can enjoy it in *warm* toddy, beside a comfortable *fire*, before retiring to rest for the night.'

"Dr. Prout, who first discovered the diminution of carbonic acid in the respiration, was of the opinion that sugar and alcohol are formed in the stomach into fat by deoxidation. (See his *Stomach, &c., Diseases*, p. 27 of the introduction.) Dr. Wood, of Philadelphia, in his last work on Therapeutics, expresses the same opinion. Most medical men, perhaps, attribute the stoutness of beer and wine drinkers partly to the alcohol, and not altogether to the saccharine principles of those liquids. Drs. Taylor and Rees, quoting Dr. Prout, and the most careful experiments of Dr. Böcker, say: 'When in the blood it (*i.e.* alcohol) does not serve as fuel for the oxygen.' 'Dr. Snow, from his

researches, has also arrived at the conclusion, that alcohol, like chloroform and ether, diminishes the process of oxidation in the body; hence the lowering of the temperature, and the alteration in the colour of the blood'" (p. 5).

As illustrative of Dr. Lees' main positions in those years,—and in great part still, if we only regard as still open the vexed question of elimination,—we cite the following as a clear and representative passage:—

"The second question, 'Whether alcohol combines with the oxygen of the blood, when taken in moderate quantities?' I also answer in the affirmative. If 'authority' is not all on one side, I fearlessly assert that *facts are.* Mere 'opinions,' I have already said, must go for nothing in this discussion; and the *evidence* for an adverse opinion to the one held by Professor Carpenter is certainly not adduced in Dr. Browne's postscript. '*The temperature of the body falls for some hours after taking wine,* and *the carbonic acid of the respired air is diminished.*' Ergo, what? This is a strong lance of science adroitly turned against us! All these effects, however, are perfectly compatible with the theory we espouse. The alcohol has, nevertheless, been *burnt;* but it has done three things besides—1st, It has prevented better fuel than itself from being consumed, and the lessened temperature is the difference-of-loss. 2nd, It has excited the nerves, and subsequently ensured collapse, as a stimulant. 3rd, It has retained *effete* matter to deaden the system, and *add* to the narcotism, thereby affecting respiration.

In a treble way, therefore, it exerts a perverting influence over nutrition. The *stoutness* (or flabbiness) of beer-drinkers is due to the *retention* of oil in the vital lamp—spirit having been burnt instead! No doubt, as stated by Dr. Snow, alcohol *does* diminish the oxidation *of the body;* but precisely because, by being oxidised *itself*, it diminishes the activity of the vital processes. These facts are all-important, and, as Dr. Browne has no doubt always perceived, form the immovable pillars of Temperance Science."

In the "New Introduction" to one of his works, Dr. Lees thus refers to these modifications of sentiment:—

"More than twenty years have passed since the first portion of *The History of Alcohol* appeared, under the title of *Scientific Testotalism.* (See p. 55.) The unceasing progress of chemistry and physiology, involving as they do a vast number of novel and important experiments, might naturally have been expected to have superseded, if not to have corrected, some of the statements of that work. This has been the case but to a very limited extent; for while the *main* positions have been confirmed in all their integrity, minor statements have been simply modified by the steady advance of modern science. The author had, indeed, in various places, hypothetically argued upon *Liebig's* generally accepted theory of the *decomposition* of alcohol in the blood, showing that, on the supposition of its possible truth, the just conclusion was by no means in favour of the dietetic use of that poison as a heat-producer.

But he had also guarded himself by the distinct statement, in 1843, that the theory *was not proved;* nay, that facts, of which Liebig seemed ignorant, went to show that *the great bulk of the alcohol* taken at any time was ELIMINATED from the system unchanged."

With the abatement due, in the light of the foregoing extract from the Browne and Lees' Discussion, this claim is unquestionable, as Dr. Lees proves by a few words of his own, which he quotes from a long anterior discussion. We will quote him more largely than he himself does, for the words deserve consideration, especially when we take into account the time in which they were uttered, 1843, when the new Liebigian theory had just been launched. They are further important as calling attention to this important failing in Liebig, that he was, in all those investigations, too indifferent to physiology, and too exclusively chemical. In that public discussion in 1843, Dr. Lees said :—

"Granting that some portion of this alcohol may become decomposed in the blood, the question arises, Does this take place without injury to other functions of the system? If not, its use must be as indefensible as ever. I question, however, whether alcohol is so easily decomposed in the system as Liebig represents, and I contend that many physiological experiments, of which he does not seem to have had any cognisance, support the position, that this irritating and most indigestible substance, as regards the great bulk of it taken at any time, passes off from the system

through the skin and lungs unchanged and undecomposed." *

Dr. Lees further observed, at that same early period, —"It has been alleged that this agent, at however great a loss of substance and labour, is still useful as an element of respiration. But the reverse of this is the fact. Experience, in the coldest regions of the globe, has clearly shown that the power of the human system to resist the low temperature of the arctic latitudes is positively impaired, and perceptibly lessened, by the use of alcoholic liquors. The warmth which they produce is not heat *generated in the blood*, but simply the sudden *sensation* of heat (or burning) transmitted by the nervous telegraphs to the sensorium." † It is further and fully accounted for by Dr. Richardson, as we shall see, by the first delusive flush consequent on the heart being uncurbed by alcohol.

These positions of Dr. Lees in 1843, are, in all essential respects, identical with those propounded by the most advanced physiologists of 1873. After all the light that has converged from various angles on the field of inquiry, the newest and best balanced result is just that to which, in the words cited, the temperance orator gave articulate expression thirty years before. In conceding the oxidation of part of the alcohol imbibed, Dr. Lees, Professor Carpenter, and the other temperance physiologists of the time, did what was not only natural but politic and right. There was no

* Lees' *History of Alcohol*, 1843, App. A., p. xii.

† *Physiol. Hist. of Alcohol*, 1846, p. 39.

need to stake vital issues on such a point. Sufficient for the present was the Scotch formula of dubious verdict, "not proven;" for if proven it should ever be, they were ready to prefer and make good the ulterior plea—"not relevant." This, as we shall see, is the very ground more recently taken against Dr. Anstie and his fellow oxidisers by Dr. Parkes and others of our foremost and most recent experimenters in alcohol. In this suspensory verdict the champions of total abstinence gave an example of moderation which some of the dignitaries of science, with all their professed aversion to extremes, would have done well to imitate. Not content with twitting teetotalers for "quite overlooking this use of spirit in the animal ecomony," * a fact "the more to be wondered at considering the light modern chemistry has thrown on the subject," † these men of science pronounced the dictum of Liebig, that alcohol is burned in the body, to have been proved, though neither then nor to this day have they succeeded in discovering for us a single product of the alleged combustion. Which of the two parties were the extremists?

Conceding the possible partial conversion of alcohol as fuel in the vital furnace, the temperance physiologists of the time held it to be condemnation enough, that its very defenders admitted it to be of all vital fuel the dearest and the worst. The Westminster reviewer of July, 1855, could not but own, after

* Dr. Pereira. † Dr. Paris.

his master, that alcohol is not in the long run so good a producer of heat as food is. Professor Carpenter, in his reply to those new positions (in articles in the *Scottish Review*, 1855), interestingly and variously illustrates the noxious effects of this spurious fuel, even on the supposition that it is partially used for this end. The following is the rationale of the process, as exhibited in his *Physiology of Total Abstinence*:—

"Now, if any cause should obstruct the perfect performance of this process of oxidation, the effete matter, instead of being removed from the blood in a fully-oxidised condition nearly as fast as it enters it, is only partially got rid of; and it thus tends to accumulate in the circulating current, or is discharged in some lower form of oxidation,—just as when a lamp or a furnace *smokes* from being supplied with oxygen in an insufficient degree to effect perfect combustion. And among other evidences of this fact, which the experience of every one will enable him to recognise, is the offensive odour which proceeds from the persons of those who have been for some time pent-up in ill-ventilated apartments, and which helps, with the accumulated carbonic acid of the respiration, to contaminate the whole atmosphere. Thus, then, we may liken the living body to a manufactory, wherein various operations are going on, which involve the production of matters too noxious to be kept in it; for the consumption of these a furnace is provided, which, when in full operation, burns them off as fast as they are produced, and thus gives their components back to the

atmosphere in the least injurious form; and the heat which is thus generated serves to warm the manufactory. But if the access of air to the furnace be prevented or impeded, then the offensive matter is either got rid of by an imperfect combustion, the products of which have not lost their noxious character, or it accumulates within the building to the great discomfort and injury of all exposed to its effluvia.

"Now, it is one of the properties of alcohol, that it so readily undergoes combustion, when exposed under the requisite conditions to the contact of oxygen, as to prevent the oxygenation of other substances whose affinity for oxygen is less. Of this we have a familiar example, in its well-known power of preserving bodies which have a tendency to putrefaction; for that process, which cannot take place without oxygen, is prevented by the prior appropriation of that element to the combustion of the alcohol in which such substances may be immersed. So if—to revert to our previous comparison—whilst our furnace-fire is effectually doing its duty in consuming all the noxious products of our manufactory, some alcohol be poured on the flame, *this* will immediately blaze up, undergoing as rapid a combustion as the limited supply of oxygen will allow, and thus checking for a time the combustion of the offensive fuel, which the fire was previously serving to consume. Hence it will in effect produce exactly the same result, in regard to these substances, as that which would be occasioned by cutting off the draught of air; for they must remain almost or completely un-

consumed, so long as the alcohol remains to set up the first claim on the limited supply of oxygen." *

Clear as Professor Carpenter's demonstration is, it becomes irresistible when backed by the many instances he adduces of the proved failure and consequent abandonment of alcohol as a ministrant of heat in arctic expeditions, and other cases in which it had been absolutely confided in as infallible. These, however, we reserve, as entitled, with kindred experimental evidence, to be arranged in their own place in distinct relief.

* Sections 7, 8.

CHAPTER IV.

The Parisian Experiments of 1860.

Our next halting place in this rapid sketch of the progress of temperance physiology is one at which it is pleasant to linger, for there we not only make a decided stage of advance, but we find it heralded by the very organ whose previous teachings it confutes, and that in the best spirit, alike of true science and of true manhood. The "physiological errors" were handsomely recalled and expiated.

1. *The Parisian Experiments Expounded in the "Westminster Review."*

The same *Westminster Review* in whose pages, in 1855, appeared the objectionable article on which we have been commenting, *The Physiological Errors of Teetotalism*, came out in January 1861, with a very remarkable leader from the pen of Professor Carpenter, entitled, *Alcohol: What becomes of it in the Living Body?* This was accompanied with the following editorial note:—"Since the date of our former article, scientific research has brought to light important facts which necessarily modify the opinions we then expressed concerning the *rôle* of alcohol in the human body. *Faithful* to the revelations of science, rather

than mindful of consistency, we hasten to lay before our readers the last results of a long and laborious series of experiments bearing on the subject in question."

About the same time, Dr. Edward Smith, of London, expounded these discoveries in a paper read before the Society of Arts, and published in that society's journal, and followed them up, as he had already in part anticipated them, with independent and fruitful investigations of his own. These discoveries take up the broken link of progress at the point where Dr. Percy left it twenty years before, and go to prove what his experiments clearly indicated, that alcohol, so far as traced, undergoes no change in the human system, but is dealt with by it as a venomous intruder, and is as promptly as possible sent out unchanged. How this gleam of promise got overcast under the gigantic shadow of Baron Liebig, we have amply shown. We are now to see how certain Parisian *savans*, who probably knew not that Dr. Percy had ever existed, spanned that gulf of twenty years by catching up his neglected link, and firmly welding and enwreathing it into the chain of scientific truth. Thus, in these Parisians, we have Dr. Percy, whom Liebig had beheaded, risen from the dead.

The occasion of this discovery was a series of prolonged investigations by MM. Lallemand, Perrin, and Duroy, which incidentally led to the study of alcohol, and the results of which they at length gave to the world *in* 1860, in a goodly volume, illustrated by plates,

entitled, *Du Rôle de l'Alcool et des Anesthesiques dans l'Organisme, Recherches Expérimentales*, or, *Experimental Researches into the Action of Alcohol and of the Anœsthetics in the Human Organism.* Finding that chloroform underwent no combustion in the system, they extended their researches to other anæsthetics, and to kindred substances as well. Prominent among these was alcohol, whose relation to the anæsthetics is the closest, both chemically and physiologically. Distillation and condensation were their earlier resorts, as they had been with Dr. Percy twenty years before, and by them they distinctly verified his results. They found, as he had done, that the imbibed alcohol is absorbed by the veins of the stomach into the blood, from which it is instantly abstracted into the substance of the brain and nerves. Their efforts, however, to obtain alcohol by distillation from the vapour breathed by two brandy drinkers proved unsuccessful; but having by good fortune incidentally attached to the extremity of their condensing implement a tube containing a red chromic solution, which certain reagents change to an emerald green, they found that the breath of the two brandy imbibers rapidly produced this change, the alcohol reducing the chromic acid to the green oxide of chromium.

Struck by this discovery they zealously followed it out. They first ascertained that the breath of persons who had not taken alcohol for many hours caused no transcoloration, which was an important negative proof. *They next set themselves* to determine whether the

derivatives of alcohol, namely, aldehyde and acetic acid, could be detected in the blood when alcohol was imbibed; but except slight traces of acetic acid, which they could otherwise account for, they found none—another important negative proof that alcohol undergoes no change in the human system. They now applied their chromic test to the blood and brains of animals poisoned by alcohol. Instantly the change of their testing solution from red to green declared, as their distilling process had previously done, the presence of alcohol pure and simple in these parts. It was thus conclusively demonstrated that the transcoloration of the acid solution, in all those experiments, was due to the presence and agency of alcohol without change, even into its two immediate and easily detected derivatives. The chromic test having thus fairly vindicated itself, its discoverers proceeded to apply it in a series of varied and richly remunerative experiments.

Taking the "method of volume" so well known in quantitative analysis, they passed the alcoholic breath through a tube of definite diameter, containing the chromic solution in definite quantity and of definite strength, and as the change in one tube became complete they substituted another, and thus determined the amount of alcohol eliminated at different points of time after it had been imbibed, till the purifying process had exhausted itself so far as the lungs were concerned. The other excretory organs, the kidneys and *the skin*, were experimented on in the same

manner, and yielded confirmatory and corresponding results.

Our scientific detectives eagerly dogged the poisonous destroyer in its course through the circulation into all the structures and tissues, its chief haunts being the brain and the liver. Its relative quantities in these organs varied according as the alcohol was imbibed or injected into the blood. In the former case the liver was found to contain most, in the latter the brain; the explanation of this being the short road alcohol has to travel between the stomach and the liver, into which it passes through the gateway of the portal vein. The quantity of the poison they found in the muscular tissues was comparatively small.

Vary these experiments as they might, these Parisian investigators were ever conducted to the one conclusion, that in the human system alcohol is not burned as a heat-forming food, but zealously expelled as a death-dealing poison. No hive of honey-bees is more prompt in repelling an invasion of wasps, than are the affiliated organs of excretion in eliminating from the outraged economy the last monad of the alcoholic invader. Even when the quantity taken is inconsiderable, these organs, as the above-cited experiments show, never fail to ply their function for that benignant end; and when the quantity taken is large, they must just ply that function the longer, if they do not fatally succumb. If full elimination is not achieved, so much the worse: for then, so far as known to this hour, the *alcohol remains*, not because it is converted, but as

poisonous alcohol still, and for no other or better reason than that the eliminating organs have exhausted their power to expel it.

True, the amount detected by that chromic test is small in proportion to the quantity imbibed; and often since has this been urged as proof that so much of it must be converted in the system; but this is assertion merely, and not evidence; and the Parisian experimenters, says Professor Carpenter, "very justly urge, that such a demonstration cannot fairly be exacted, all circumstances considered; and that all the evidence which the nature of the case admits, points in one direction." Of this we have sufficient indication in the variously prolonged periods during which the elimination of alcohol is found to go on, and by the abundance in which it has been obtained in the brain, liver, and blood. The length of time, too, in which alcohol is known to remain in the vital furnace unchanged, strongly militates against the theory of its combustion; while the quantities in which it is found in substance in the emunctory products of the lungs, kidneys, and skin—quantities considerable at first, then gradually lessening—argue a persistent expulsion of the article unchanged, so long as a trace of it remains. "Our authors," says Professor Carpenter, "justly lay stress on the fact, that it is not the mere excess of alcohol which the system cannot profitably use up, that finds its way into the excretions; for they detected alcohol in the urine of a man within half-an-hour *after he had* taken no more than 30 grammes

(463 grains) of brandy; and in the case already cited, the ingestion of only a litre (or ordinary bottle) of weak wine gave rise to a continual elimination of alcohol by the lungs during eight hours, and by the kidneys during fourteen hours. A very striking proof of the length of time during which alcohol remains unmodified in the system, after being ingested in any considerable amount, is afforded by the fact that it was found in abundance in the brain, liver, and blood of a vigorous man, who died of the remote results of alcoholic poisoning, *thirty-two hours* after drinking a litre of brandy, notwithstanding the early use of emetics and other remedial means."

On the pathology of alcoholic poisoning, the results of these Parisian experiments corroborate, without much adding to, the conclusions already reached by men of science in this country. The most interesting discovery they have made is that of globules of fat, shining even to the naked eye like beads, in the blood drawn from animals intoxicated with alcohol—thus confirming the doctrine of those pathologists who maintain that alcoholic excess increases the fatty ingredients of the blood to an extent subversive of its proper nutritive qualities. This perversion of the vital fluid is also produced by the anæsthetics. In both cases it passes off with the other prominent effects of intoxication, when the evil spirit has been expelled in such ways as we have above described. The *prominent* effects, we say; for, as Professor Miller impressively urges in his *Alcohol*, let no toper flatter himself that

when he has snored out his drunken sleep, and even paid his next day's headache, he has discharged his last score of penal debt to the laws of an outraged organism.

These Parisian experiments, then, fairly prove—if experiment can prove anything—that whether the human system be able to expel alcohol as an enemy, or be not able, it will at least make the attempt. The very presence of alcohol in any quantity, however small, is danger-signal sufficient to rouse the alarmed organism, and sting its energies to the prompt and persistent discharge of the duty of repelling the intruder with the least possible delay. A nation of patriots will hold no parley with an invader, so long as he occupies an inch of the sacred soil. What care they about analysing his qualities or peculiarities, when they already know that his very footing there is usurpation with hostile intent, and that their one duty in regard to him is promptly and energetically to expel him from their midst. A living organism, in like manner, rejects alcohol, pure and simple. If there are some things "to be delivered with care," there are others to be rejected without ceremony; and with the human system one of these things is alcohol. The insulted and menaced organs unanimously vote its elimination.

This word *elimination*, by the way, is not unfrequently misunderstood, as if it meant to *elicit*. Correctly understood it has great significance. As its etymology (*e limine*) shows, it means to expel *from the*

very threshold; to meet the intruder, if possible, on the door-step, and bid him begone! This is the plain and articulate doctrine of these Parisian savans, when they tell us that the body expels alcohol "en totalité et en nature." It recalls the homely incident of a certain man in a story, who suddenly rose from the little group among whom he had sat down; and on being interrogated in regard to his abrupt departure, he replied that he had to go to a dinner party, the hour of which had well nigh arrived. Greatly to the surprise of his companions, he rejoined them in a few minutes. On being asked why he had made his appearance again so soon, he evasively replied, "I got a hint;" and on being more minutely interrogated as to the nature of that hint, he at length distinctly replied, "They kicked me down stairs." The "hint" possessed a significance that could by no possibility be mistaken: the too complacent intrant was so superlatively unwelcome as to be straightway *eliminated*, or *pitched out of doors*. Of such sort is the hint or testimony practically borne by the human system in regard to the unwelcome and dangerous character of that arch-intruder, alcohol.

The Parisian experimenters give (at pp. 229-233) a *resumé* of their results, which may appropriately wind up this section. We present it as translated by Dr. Lees, who aptly calls it the "Alcoholic Alphabet":—

A.—Alcohol, ingested into the stomach, applied to the skin, or introduced as vapour into the lungs, is absorbed by the *veins*, and carried by the blood into all the tissues.

B.—The injection of alcohol produces upon animals an intoxication that is *marked by a progressive series of functional disturbances and alterations*, the *intensity of which corresponds with the quantity of alcohol absorbed.*

C.—It manifests itself at first by a general excitement; but, by and by, the respiration and circulation are relaxed and the temperature lowered.

D.—*The muscular power is weakened and extinguished*, always beginning at the extremities.

E.—The insensibility gradually extends to the centres (as in dead drunkenness).

F.—The heart is the last to die (*ultimum moriens*).

G.—The time that elapses between the beginning of intoxication and death varies from forty-five minutes to three hours.

H.—When the dose is not sufficient to induce death, the excitability of the nervous system returns after a time, varying with circumstances.

I.—The arterial blood remains bright, and preserves all its apparent qualities nearly up to the moment of death.

J.—*Alcoholised blood contains, during life and after death, a great number of free fatty globules, visible even to the naked eye.*

K.—The pathological alterations are: *very vivid inflammation of the mucous membrane of the stomach;* the accumulation of blood in the right chamber of the heart and the large veins; congestion of the *meninges*, and especially of the lungs.

L.—All solids or liquids in union with alcohol are easily separated by distillation, or proportionately, by the method of volumes.

M.—*Alcohol, taken by the stomach, accumulates in the liver and the substance of the brain;* if in the blood, it is represented as 1·0; in the brain, it is 1·34; in the liver, 1·48.

N.—Diluted alcohol produces the same effect when introduced

by injection into the veins as when taken into the stomach, but operates more rapidly. The animal succumbs in less than twenty minutes.

O.—Alcohol, injected into the veins, spreads to all the tissues, but accumulates most largely in the brain; being in the liver, 1·75; in the cerebral matter, 3.

P.—*Death by alcoholic poisoning is due primarily to its special action upon the nervous centres.*

Q.—After the ingestion of a small dose of brandy (25 grammes = 360 grains), the blood continues to manifest the presence of alcohol by chemical reactions for many hours.

R.—*We never found, in either the blood or tissues, any of the derivatives of alcohol.*

S.—Only in the stomach was found a trace of acetic acid, generated from alcohol by the ferment of the gastric juice.

T.—*Alcohol is rejected from the vital economy by divers systems of elimination, by the lungs, the skin, and the kidneys.*

U.—These organs are found to eliminate alcohol after the ingestion of doses very small (*plus petites*).

V.—The elimination lasts many hours, even after an ingestion very moderate. The kidneys continue longest to reject it.

X.—Aldehyde, introduced into the stomach, *is* readily found in the blood.

Y.—The aldehyde is, in great part, eliminated; in part transformed into acetic acid.

Z.—Alcohol has the same action, and produces the same effects upon men and upon the lower animals.

"Finally, we translate the 'Conclusions' to which these experimenters have been conducted, and which may fairly be called 'The Seven Pillars of Temperance':—

1. Alcohol is not food.
2. Alcohol is a special modifier of the nervous system. It acts, in a feeble dose, as an excitant; in a larger, as a stupefiant.
3. Alcohol is never transformed, never destroyed, in the organism.
4. Alcohol accumulates, by a sort of elective affinity, in the brain and in the liver.
5. Alcohol is eliminated from the organism in totality and in nature. The channels of elimination are—the lungs, the skin, and, above all, the kidneys.
6. Alcohol has a pathogenetic influence, material and direct, upon the development of many functional disturbances and organic alterations of the brain, the liver, and the kidneys.
7. Spirituous drinks owe to the alcohol they contain their common properties and the specialty of their effects. The use of fermented and distilled liquors is often noxious. It should be always very restrained; it should never be tolerated, save in exceptional circumstances.

2. *Subsequent Investigation and Discussion over the Parisian Results of* 1860—*Elimination Question continued.*

The positions of the Paris experimenters were not permitted to pass unchallenged. M. Edmond Baudot objected to them, that the amount of alcohol expelled was small compared with the dose taken in."* To these papers Perrin promptly replied.† The results

* *Union Medicale*, Sept. and Nov., 1863.

† Ib., Dec., 1863.

appear to have commanded in France a very general assent. "It has been shown," says Trousseau, "by the recent experiments of Maurice, Ludger, Lallemand, and Duroy, that alcohol is not decomposed in traversing the organism, and that it does not resolve itself into secondary products, such as carbonic acid and aldehyde, as used to be believed; but that, during the whole period of its sojourn in the tissues, it is alcohol, and as alcohol acts on them." * In England the same opinion predominated. *The British Medical Journal* promptly owned that there was no use blinking the fact that alcohol now stood, and by the system was treated, as a convicted venomous intruder. Some able men, however, disputed the fact. That some alcohol was excluded unchanged they could not but admit; but this being proportionally small, they contended that the system had used up the greater part, and that the portion expelled was mere surplus. To this it was forcibly replied that the means for collecting and detecting the amount eliminated through the various emunctories were so manifestly and miserably inadequate, that no trustworthy conclusion could be reared upon them; that the undetected portion might be eliminated in modes too subtle for detection, and with sufficient allowance of time; that if not, and if much remained in the system, there at least existed, as yet, no proof whatever that it underwent combustion there, no products of such a

* *Lectures on Clinical Medicine*, delivered at the Hôtel Dieu, Paris, 1870. Vol. iii., p. 431.

change having yet been detected; and that it was at variance with all physiological analogy to suppose that, of the self-same substance, the organs first appropriated with comfort a certain portion as fuel-food, and then expelled the rest with agonistic violence as an unendurable and destructive poison. On these and kindred grounds, Dr. Edward Smith and others maintained—and, so far as has yet been shown, most righteously maintained—the validity of the conclusions affirmed by the Parisian experimenters.

To put the matter in plain popular parlance, in my own way, it does sound very odd to be told that of the self-same substance, taken in, it may be, at one gulp, nature uses part as a life-sustaining element and gives God thanks, and spits out the rest as a deadly poison, accompanied with something like a malediction on whoever sent it in. Or, conversely, that I put a half a pound of steak of uniform fibre into my stomach, four ounces of which my personal physiology uses as a food and gives God thanks, and four ounces of which it painfully expels as a poison, and curses me for a fool for having ever taken it in. Or, once more, suppose that of four thieves by habit and repute, all alike bad, who have come into your counting-house and proffered their services, any Glasgow merchant should say, "Two of you I shall turn to the door as unredeemed rogues, but the other two I will retain to look after my safes." It *becomes* us to speak with diffidence; but we are at a

loss to conceive on what sound physiological principle such a theory can be vindicated.

Since writing the above, we find that Dr. Lees has employed a very similar illustration. "It is to suppose," he says, "that after the vital organs and tissues have for so many hours treated alcohol as an intruder, kicking it from chamber to passage, and from passage to door, and window, and drain, they suddenly alter their conduct and relationship, and begin to treat some fancied remainder as a friend and factor—the burglar becomes a brother—the foe is transformed into a lover —and the deadly poison transmuted into life-giving food. When a reasoner has reached this climax, he is in that condition in which even the gods cannot help him." (In *Meliora*, Jan., 1863, p. 5.)

Meanwhile, concurrently with these discussions in the medical journals and elsewhere, important experiments were instituted; on one side by Dr. Edward Smith, who had long been zealous in the investigation, by Professor Parkes, by Count Wollowicz (none of whom are now alive), and very notably by Dr. Richardson; and on the other side by Drs. Anstie, Thudichum, and Dupré, whose observations, besides being otherwise doubtful, did not embrace all the organs of excretion. Dr. Subbotin, by a variety of experiments, in 1870, found that much more alcohol was expelled from the body unchanged than had previously been detected. This made it most warrantable to infer, especially in the total lack of positive evidence to the contrary, that *the human system* refuses to convert and use alcohol for

its needs, but does its best to expel it, and that what of the drug may persist in remaining, remains not for its use, but as an unrelieved and implacable foe. Even if it were found that some lingering portion did undergo conversion—of which, however, up to this hour, there has not been produced one vestige of proof—the fact, though interesting, would be unimportant; for, as Professor Parkes aptly observed, in a letter to Dr. Anstie in the *Practitioner* (Feb., 1872), "This fact alone would not guide us to the dietetic value of alcohol," seeing "we have first to trace the effect of that destruction, and learn whether it is for good or for evil." Dr. Anstie himself, it ought to be observed, defends alcohol only as administered in small doses, and thus implicitly condemns its free use as a salubrious, or even as a safe beverage. Many and emphatic, indeed, are his warnings on this head.

On the solid ground above stated, temperance reformers stood, and still stand, firm and calm. They never intermeddled much with that question of elimination, leaving it to scientific men to determine, and feeling their ground firm beneath their feet as the eternal adamant, however the case might go. But though neutral, they were not uninterested spectators. They saw that those investigators who were adverse to their views, with all their scrutiny, had not succeeded in tracing an atom of alcohol in the form of aldehyde, acetic acid, or any other of its well-known derivatives, and that so far from finding any *trace of its* conversion into fuel for the vital furnace,

some of them (Dr. Thudichum, for example) actually began to find that it depressed animal heat. So did some Continental investigators, particularly Professor Binz, of Bonn, who candidly says,—"We started with the conviction that the stimulating influence of alcohol was as indubitable on the vital properties of the juices as on the nervous system, but the result of our experiments were not in accordance with this view." This fact of the heat-depressing influence of alcohol had been indicated early in the century by Fyfe and Prout, so that it has not been entirely without witness. But it was reserved for a masterly experimenter in these very years to determine the fact conclusively, to seize its significance with the instinct of genius, and, with unsurpassed lucidity of exposition, to use it as a very besom of destruction, with which to sweep the ground clear of the last vestige of the Liebigian dictum, that the body utilises alcohol by manufacturing it into fuel for its stove. I refer, of course, to Dr. Benjamin W. Richardson, of London.

It was at the British Association at Birmingham, in 1866, in giving in his report of investigations on alcohol, made at their request, that Dr. Richardson first enunciated his views. Three years after, at the close of 1869, he further expounded them in a lecture, entitled "Physiological Research on Alcohols."* The main feature in his results was the remarkable and continuous decrease in the temperature of the body

*See *Medical Times and Gazette*, Dec. 18, 1869.

under the action of alcohol after the first stage of momentary exhilaration. He first describes the entire family of alcohols, and then heads up his results in a review. As this is brief and terse, I shall cull a morsel or two that will represent the whole. He says,—"Under all the alcohols animal temperature falls; under all, when they are administered with sufficient freedom, motion and sensation are paralysed. The order of action on the various parts of the organism is uniform. The first action seems to be in the centres of voluntary motion, next on the centres of consciousness, grey matter of the hemispheres, and next in centres of sensation, or those centres through which sensations are transmitted to the centres of consciousness. When all these parts are under the alcoholic influence the intoxication is complete; there is all but death." And yet death comes not yet, owing to compensatory arrangements—"The animal fire smoulders, but does not go out. In this particular of action lies the safety of common alcohol in respect to its immediate effects. Every profound intoxication would be a fatal catastrophe, were not this involuntary power of breathing and of circulating blood specially retained." Next comes the debated question—"What is the mode of action of the alcohols? Do they arrest oxidation, or do they themselves undergo oxidation?" Are they burned in the body, or are they not burned at all? After noticing Lallemand and his confreres, he refers to the counter experiments of Drs. Thudichum and

Dupré, pronouncing Thudichum's book to be a model, but denying the validity of his conclusion; and then says—"I can deduce from them no evidence at any stage of intoxication that there is increase of power in the organism. I admit in the first stage there is what is called excitement, and a slight but brief increase of temperature; but that does not occur to me as being anything more than the result of local excitation, the effect of a local irritant on the extremities of nerve. . . . So soon as the alcohol makes its way into the organism and diffuses through the fluids, so soon there is depression, so soon respiration falls; carbonic acid gas, from respiration, decreases, and muscular strength, consciousness, and sensibility decline." With marked emphasis he adds,—"Above all, against the idea of active combustion of alcohols in the body, is the overwhelming fact of reduction of temperature." He thus concludes,—"Speaking honestly, I cannot by any argument yet presented to me admit the alcohols through any gate that might distinguish them as apart from other chemical bodies. I can no more accept them as foods than I can chloroform, or ether, or methylal. That they produce a temporary excitement is true, but as their general action is to reduce animal heat, I cannot see how they can support animal force." The true character of the alcohols is, that they "are agreeable temporary shrouds. . . . To resort for force to alcohol is, to my mind, equivalent to the act of searching for the sun in subterranean

gloom, until all is night." How manifestly true. It is to seek the living among the dead.

It was five years subsequently to this important deliverance that Dr. Richardson elaborated his views in his famous Cantor Lecture, and has since enforced and expanded them with such indefatigable zeal. But the foregoing researches, with their remarkable results, proving how steadily and rapidly alcohol reduces animal heat, virtually settled the vexed question of combustion or elimination; for it seems nothing less than a contradiction to maintain that alcohol is converted in the system into fuel for the support of animal heat, when facts demonstrate that it is an actual depressor of animal heat. This would be to make the animal stove to blow hot and cold in the self-same breath. If it be thus fairly established that alcohol is not converted into organic fuel and burned in the body, the minor question of how far elimination may be found to go, and of what becomes of such portions of alcohol as remain uneliminated, or at least unaccounted for, is one of interest, indeed, but still only of secondary importance.

As the discussions and investigations we have passed under review have thus issued in results which bring us very much back to the standpoint attained by the Parisian investigators of 1860, we are now ripe to deal decisively with the true character of alcohol. The data are sufficiently determinate and ample for this end. We shall therefore suspend our further references to the more recent utterances of Dr. Richardson

and other high medical authorities on the subject, in order to deal systematically, at this stage, when we are now ripe for it, with some cardinal alcoholic questions, and, in particular, to determine whether the questionable thing be in any sense a food, or be simply a poison. A food in the proper, or flesh-forming sense, all admit —for its composition demonstrates—it is not, and cannot be. But a food of the heat-creating or fuel sort, many still declare it is; and even when persecuted out of this stronghold, there are not wanting other indirect senses into which they will flee to make good their client's claim to be in some sense a food.

CHAPTER V.

IS ALCOHOL IN ANY SENSE A FOOD?

1. *What the Parisian Results indicate on this Question.*

THE subject of alcohol occupies fully one-half of the large volume of MM. Lallemand & Company, the rest being devoted to anæsthetics, which, as they show, are eliminated in the same way as alcohol, but more promptly, and with effects much less mischievous. We refer to such substances as chloroform, sulphuric ether, and amelyne. Professor Carpenter forcibly urges, that if, according to the Liebigian theory, alcohol be a food, so (*horribile dictu!*) must these anæsthetics be also foods. And the better to prepare ourselves to weigh his reasons for this affirmation, let us first follow him in the comparative view he presents of the "behaviour"—as chemists say—of alcohol and of the anæsthetics in the living system, which exhibit "a perfect accordance" on the whole. "When alcohol," he says, "is taken into the stomach, it is absorbed into the general current of the circulation, and is carried by it to every tissue and organ in the body. In the tissues, generally, only feeble traces of its presence can be detected, but it fastens on the substance of the brain and of the liver by a peculiar "elective affinity," so as to be yielded by these in far larger proportion than by an equivalent amount of blood. Precisely the same is the case with chloroform, ether, and amelyne when they are intro-

duced into the current of the circulation by inhalation through the lungs; the elective affinity of the first two of these for the brain and liver being somewhat stronger than that of alcohol, while that of the third is weaker. From the time when alcohol and the anæsthetics have been introduced into the circulation, the system commences to free itself from them, by setting in action the three great eliminating apparatuses, the lungs, the skin, and the kidneys. The most volatile of these substances are got rid of most rapidly (as might have been anticipated) by exhalation from the lungs, the skin also slightly assisting, and coincidently with their removal from the blood, their physiological effects pass off likewise."

It may be well to introduce here, not merely for the sake of the less informed reader, but as involving a principle equally applicable to the question of alcohol as a food, and of alcohol as a poison, some brief reiteration and illustration of the physiological fact which Professor Carpenter here refers to under the name of "elective affinity." When the elements of food in the stomach have passed, in the form of chyle, into the current of the circulation, and become blood, they are borne in that life-fluid to all parts of the system. In the capillaries, or extremely hair-like arteries, they give out their nutrient virtues; after which, the impoverished blood, with the waste matter it has gathered up, passes into the veins, and is by them introduced into the right cavity of the heart, whence it is pro*pelled through the* lungs, to be there oxygenated anew,

and thence, on its return to the left side of the heart, to be propelled again along the arteries through all parts of the body. The heart, we may here state, is properly a double organ, and it is the centre of a double circulation, which passes in and out of it after the fashion of the figure 8—the pulmonary circulation, or minor circle through the lungs, and the systemic, or larger circle, that permeates the entire system. In this latter case, of course, the blood sets out through the great aorta on a mission of vital support to all parts of the organism; and each particular tissue—muscular fibre, bone, cartilage, nerve-substance, or whatever else—takes from the circulating globules of the blood the precise element that suits it, and leaves all the rest. This is precisely what is meant by the phrase "elective affinity;" and each of these two words will thus be seen to have a significance that will be readily understood.

Now, it is specially interesting and important to observe that, as the arrangements of the human system are uniform, they will operate on the same principles in perverted as in normal cases. When true food is taken in, the system will be supported in the way we have seen, on that principle of "elective affinity." But, also, on that self-same principle of "elective affinity" will it be disarranged or destroyed when poisons are taken in. They, too, as they pass through the current, will be respectively taken up by particular tissues, rather than by others; and hence toxicologists explain, under each several poison, the special tissue or organ

on which it electively fastens. To give a few examples —strychnine acts on the spinal cord; oil of tobacco on the heart; arsenic on the mucous membrane of the alimentary canal; mercury on the mouth and salivary glands; iodine on the lymphatic glands; and so in other cases. Dr. Christison, of whom, on the subject of poisons, Professor Miller testifies that he knows no higher authority, says,—"Poisons are commonly, but I conceive erroneously, said to affect remotely the general system. A few of them do, indeed, appear to affect a great number of the organs of the body, but much the larger proportion seem, on the contrary, to act *on one or more organs only, and not on the general system.*"

On the self-same principle, the poison alcohol is found to have a special affinity for nerve and cerebral substance, the most delicate and vitally important of all; and to this peculiarity are attributable its most fatal effects, both in a physiological and moral point of view.

These things explained, once for all, as equally pertinent to the present question of alcohol as a food, and to the subsequent question of alcohol as a poison, let us now return to Dr. Carpenter as he thus winds up the results of those comparative experiments on the action of alcohol and the anæsthetics, which strip the former no less than the latter of all title to the name of food:—"The striking accordance which has thus been shown to exist in every fundamental particular between alcohol and the anæsthetics—the difference in their behaviour being only of a secondary character, *and being obviously* referable to their chemical and

physical properties—must surely be regarded as most strikingly confirmatory of the position taken up by the authors of this treatise in antagonism to the Liebigian doctrine, that alcohol is food. For there is not a single point of difference in their actions which can justify their being placed in different categories. Their physiological effects in large doses are essentially the same. Their special affinity for the substance of the brain and of the liver is a most striking point of uniformity. Whether alcohol be taken into the stomach, or the vapour of chloroform or ether be inhaled through the lungs, no sooner has it been received into the circulation current, than it is treated as a substance altogether foreign to the body, which is to be removed by the excretory organs as rapidly as possible. Those organs continue to eliminate it until the blood has been entirely freed from it; and then, but not till then, its perverting influence upon the nervous functions ceases to be manifested. There is no more evidence of alcohol being in any way utilised in the body than there is in regard to ether or chloroform. If alcohol is to be still distinguished as a *food*, we must extend the meaning of that term so as to make it comprehend not only ether and chloroform, but all medicines and poisons—in fact, everything that can be swallowed and absorbed, however foreign it may be to the normal constitution of the body, and however injurious to its functions. On the other hand, from no definition that can be framed of a poison, which should include those more powerful anæsthetic agents

whose poisonous character has been unfortunately too clearly manifested in a great number of instances, can alcohol be fairly shut out."

For ourselves, we here disclaim all narrow and peremptory prejudication. If, notwithstanding the known composition of vinous drinks, science and experience should combine to certify this or that hitherto undiscovered variety of them to be not only honest and pure, but for some occult reason salubrious, we shall frankly accept the verdict. But we are as yet a long way from this. First, makers, vendors, and connoisseurs are themselves all at sixes and sevens as to where even the questionable varieties in common use are to be got to answer honestly to their names. Not till this imbroglio has unwound itself, can science fairly commence to test the samples; and after it has done so, experience must have time to test science. Practically, each has tested the drinks in vogue so effectually, that any new and strange verdict is about as unlikely as an inversion of nature's laws.

2. *What Constitutes a Food?*

This is a very needful question. The claims of alcohol to be a food can be discussed only on the basis of a common understanding of what a food really is. The question is vital to the maintenance of its social place. Hence the tenacity with which its champions hold to its claim to rank among the foods, and the *temptation this* brings to stretch the definition of food

to bursting. Driven from post to post, they fall back on the ultimate ideal of an aliment, to see if a corner might not be found in it for their doubtful client. Persecuted in one definition they flee into another, and sometimes end by proposing a new definition, which runs amuck of all hitherto accepted distinctions. This will evince itself as we proceed.

No fairer definition of food could well be given than this of Béclard: "A food is a substance which, introduced into the digestive apparatus, can furnish the elements of the repair of our tissues, and the material of animal heat." * To this Dr. Anstie objects that it excludes certain substances — for example, water, which, though essential as "an integral part of every tissue," is not "chemically transformed in the body," but "passes out unchanged, after fulfilling its purposes;" † but Béclard does not so exclude it, for the terms of his definition, it will be seen, are wide enough to embrace it.

But neither Béclard's nor any other rational definition of a food can admit alcohol under that name; for if, like water, it leaves the system unchanged, there the parallelism ends. All beyond is utter contrast. "Both water and alcohol," says a medical writer, "are equally cast out of the system unchanged." But what of that? Water forms an integral part of every living tissue, alcohol of none. Water, accordingly, is taken up by every tissue to repair its waste, and, as found in

* *Traité Elementaire de la Physiologie* Humaine, Paris, 1852.

† *Stimulants and Narcotics*, p. 267.

it, is not only innocuous, but constitutes its vital sap; alcohol is taken up by no tissue whatever, and is found in none that has force to repel it. As Dr. Lees pithily remarks: "Water fulfils useful, necessary, and blessed purposes in the vital economy, *and goes out of the body in the actual discharge of a beneficent sanitary mission;* while alcohol really creates an internal commotion, defiles the vital stream, lowers and wastes the nervous forces, impairs the nutrition of the structures, and is finally expelled by the police force of the sanitary system." * When it is thrust upon it, the revolted organism does its best to expel it, and if, notwithstanding, alcohol remain in the tissues, it remains not as a constituent but as an alien, not as a food but as a poison, not to repair but to mar, and with ample proof of its havoc in every place where it is found.

This, we may add, so far as the evidence has yet gone, differentiates alcohol from such cases as salt and iron, referred to by Dr. Anstie,† for these are constituents of the system, whereas alcohol is not; and if excess in them be hurtful, a certain quantity of them in our aliment is nevertheless needful and good, whereas, so far as has been yet shown, the ordinary use of alcohol, even in moderation, is neither necessary nor innocent.

Dr. Anstie submits that "the only real test of the alimentary character of any substance is its power to support life for a longer period than it could subsist if

* *Is Alcohol an Alimentary Article?* p. 8.

† *Op. cit.*, pp. 7, 8.

deprived of all external help." * Through this gate, accordingly, he admits into the catalogue of foods oxygen as the most important; next in rank, water; then the other matters, nitrogenous and carbonaceous, familiarly known as food; and lastly the salts, iron, and other inorganic constituents of the body. But he feels that in consistency he cannot stop there. "Certain external dynamic influences, and particularly heat, light, and electricity," are no less essential, and might therefore claim also to rank as foods. To this, he confesses, "his only answer would be to allege the convenience of separate names for the material and the dynamic supports of life respectively;" but the same plea of convenience would be quite as valid, and far more in harmony with usage, popular or scientific, if set up and applied at the earlier stage indicated in Béclard's definition.

But to take higher ground, we venture with diffidence to ask, Is the power of any substance "to support life for a longer period than it could subsist if deprived of all external help" to be regarded as "the only real test," nay, as any valid test at all, of its alimentary character? Because a thing retards or procrastinates death, is it therefore a thing that alimentarily supports life? We see nothing in the premises to warrant any such conclusion. To us it seems to upset universally recognised and needful distinctions, and even to confound the conditions of life and death. The view he quotes from Professor Beale, "who con-

* *Stimulants and Narcotics*, p. 288.

tainly," he owns, "has had large experience of the alcohol treatment," may account for many, perhaps most of these examples of the death-retarding influence of alcohol. That view is, "that it is not in virtue of any real *alimentary* properties of alcohol that this is effected," but merely because alcohol is fitted "to arrest the too rapid cell-changes going on." Dr Beale further says: "Alcohol does not act as food; it does not nourish tissues; it may diminish waste by altering the consistence and chemical properties of fluids and solids. It cuts short the life of rapidly growing cells, or causes them to live more slowly. The remedies which act favourably really seem to act, *not by increasing vital power, but by decreasing the rate at which vital changes are proceeding.* This view accounts for the shrivelling of the hepatic cells, the shrinking of the secretive structure, and the increased hardness and condensation of the entire liver, which result from the continual bathing of the gland structure in blood loaded with alcohol. It accords with the gradual shrinking and condensation of tissues which occur in persons who have long been accustomed to excess. The tendency to increased formation of adipose tissue may be explained upon the same view, and the stunting which follows its exhibition to young animals is readily accounted for."

"Dr. Todd," says Dr. Anstie, "fearlessly prescribed those substances which are pre-eminently known as stimulants (viz., the alcohols) in inflammatory diseases, *because he regarded* them, in proper doses, as foods," *

* p. 56.

—a practice which the admiring pupil is obliged to add, "Dr. Todd rested on an unsatisfactory foundation." Even if physicians to a man agreed to recommend the alcohols in inflammatory diseases (and the medical signs of the times are clearly pointing the other way), that would only go to prove these alcohols to be, in that extraordinary case, a valuable medicine, and by that very fact to discredit its title to be regarded, in ordinary circumstances, as a food.

From all these tortuosities we return to the common-sense principle that what does not either build up tissue or minister to animal heat cannot be a food. That it is not in alcohol to build up tissue is plain to all; and that it just as little ministers to animal heat has also, as we have seen, been now put beyond all doubt. We set it down, therefore, as fairly demonstrated that alcohol is in no sense food.

As there is always some risk of being too one-sided, or being run away with by one favourite idea or authority, we turned to see how medical opinion is tending as reflected in some of its newest and most unbiassed teachings. Of course, it was but reasonable to expect in these teachings some transitional features of thought.

In one of the best manuals on therapeutics,* I find in the section on alcohol no small uncertainty and perplexity. It is much commended, but also much condemned. It is always suspected and cautioned

* *Handbook of Therapeutics*, by Sydney Ringer, M.D., 4th ed., 1874.

against, even where its services are drawn upon—its course at best being "a rogue's march." Under exhaustion, in convalescence, in sedentary or town life, especially in prostration after acute illness, Dr. Ringer recommends it. "Strength," he says, "can, no doubt, be best supported by food, but the weakened stomach can digest but sparingly. In such critical circumstances alcohol spurs the flagging digestion, and enables the patient to take more food" (p. 308). It may be so. It is not for laics to dogmatise, especially in critical cases. Facts, however, increasingly go to prove that there are other and "more excellent ways." Certainly this resort should be the last, for it is self-evidently the worst. Its best plea must be *necessitas durissima*, for it gives strength to the system out of the system's own strength. It robs Peter to pay—not Paul, but Peter himself.

It is strongly recommended to give the stimulant along with the food, as aiding and "supporting the patient in the best and most natural manner." "Still care must be exercised in the administration of stimulants, since it sometimes happens that if too freely given they upset the stomach, so that all food is vomited, an untoward circumstance greatly adding to the patient's danger." The real philosophy of this we take to be, that when alcohol is mixed with food the walls of the stomach are comparatively protected from its attack; whereas, taken by itself, or too freely, it *works its own proper* effect, and "upsets the stomach."

These effects in the next paragraphs are faithfully depicted.

Dr. Ringer himself furnishes the strongest arguments against tampering with alcohol, after this fashion, as medicine to be habitually taken under the guise of food. In faithfully reflecting the conflicting evidence as to the administration of alcohol, he cautions that "it may do harm as well as good," and urges that "its effects on the different functions must be carefully watched." In one case, in particular, he gives a much needed warning. He says,—"The distressing symptoms occurring in so-called hysteria, generally met with in middle-aged women, are for a time relieved by alcohol; but as the stimulant must be taken in increasing quantities, there is great danger lest the patient should acquire the habit of taking alcohol to excess. Nervous or neuralgic patients often are prone to imbibe alcohol in excess, and many women become in this way confirmed tipplers. It behoves, then, the doctor to be very guarded in his recommendation of alcoholic stimulants" (pp. 313, 314).

Dr. Ringer not only adopts but corroborates, from his own experiments, Dr. Richardson's conclusions in regard to the heat-depressing power of alcohol. He says,—"As the result of a great many observations taken every quarter of an hour for several hours, on persons of all ages, the author, in conjunction with Dr. Rickards, found that alcohol, brandy, and wine di*minish the bodi*ly temperature. After moderate

doses the fall was slight, amounting to not more than 0·4° to 0·6° Fahr.; but after poisonous doses the depression in one instance reached nearly three degrees. In rabbits the fall was much greater, reaching to ten or more degrees. These observations have been confirmed by Professor Binz, of Bonn, and by Dr. Richardson, who asserts that all alcohols reduce the animal temperature." He then refers to counter results, which he tries in part to explain.*

If alcohol thus "diminishes the bodily temperature," it is fatally wanting in the only sense in which it can act as a food. Why then persist in talking of it under that delusive and mischievous misnomer? The authority before us, in the following statements, practically answers this question, and none the less emphatically for the cautious neutrality of his tone.

"How much alcohol is consumed in the body?" asks Dr. Ringer—a question, he adds, on which opinions and results are contradictory. After stating some of these, he proceeds very judiciously as follows:—

"Even if the greater part of alcohol is consumed, and thus administers to the forces peculiar to the body, yet alcohol, by depressing functional activity, favouring degeneration, &c., may do more harm than any good it may effect by the force it sets free in its destruction. Even if taken in quantities too small to do harm, yet it can scarcely be classed as an economical food for the healthy. Granted that dietetic doses check oxydation in the healthy, and thus protect the

* *Handbook of Therapeutics*, 4th ed., 1874, pp. 310, 311.

blood and tissues, still, unless it can be shown that in health there is constantly an excess of consumption over and above that required by the body, such a diminution of oxydation could only result in lessening the amount of force set free and put at the disposal of the organs, and consequently a diminution of the functional activity of the body. Physiology failing to guide our steps amid these conflicting statements, it is obvious that, in estimating the value of alcohol in health or disease, we must rely solely on experience, which plainly shows that, for the healthy, alcohol is not a necessary or even a useful article of diet. Varied, repeated, and prolonged experience, and the testimony of army medical men, prove that troops endure fatigue and the extremes of climate better if alcohol is altogether abstained from. The experience of the celebrated Moscow campaign showed this; so also quite recently the Red River Expedition. During arduous marches it has always been found that the health of the men is exceptionally good without alcohol, but as soon as spirits are allowed disease breaks out. Modern trainers recognise the fact that the power of sustained exertion and resistance to fatigue is best promoted by abstaining from alcohol. The ill health of many athletes depends, not on the rigour of the system to which they are subjected, but on the excesses they indulge in after the contest for which they trained. "There can be no doubt that healthy persons capable of the fullest amount of mental and physical exertion without the stimulus of alcohol, not only do not require

it, but are far better without it."* The salvo he adds in favour of "the lighter beers and wines" need not here detain us.

An ounce of experience is worth ton-weights of theory. It was therefore right in Dr. Ringer to emerge from the trackless thickets of theory to the well-trodden highways of practical experience. And yet physiology is not so irresponsive as he represents. Every day its trumpet is giving forth a more certain sound.

Thus, to focus our results in a few brief dicta from high medical authorities,—"Alcohol," says Edward Smith, "is not a true food. It interferes with alimentation." "Alcohol," says Professor Moleschott, "does not deserve the name of an alimentary principle." "It is clear," says Dr. T. K. Chambers, "that we must cease to regard alcohol as in any sense an aliment." "It is," says Dr. Markham, "to all intents, a foreign agent, which the body gets rid of as soon as it can. Alcohol is not a supporter of combustion. Part, probably the whole of it, escapes from the body; and none of it, so far as we know, is assimilated. It is, therefore, not a food in the eye of science."

Very articulate is the testimony of the Parisian experimenters. Replying to the strictures of M. Baudot, who endeavoured to overturn their conclusions, Dr. Perrin said :—

"The one great principle which has to be borne in

* *Handbook of Therapeutics*, 4th ed., pp. 312, 313.

mind is, that every alimentary substance contributing to nutrition, whether this be ternary or quaternary, subjected to the active forces of the chemistry of life, rapidly loses its identity, and becomes a constituent part of the blood, and never, in the state of health, in either small or large quantity, does it ever appear in an unchanged condition in the products of excretion. On the other hand, non-alimentary substances undergo no transformation, form no constituent part of the blood, and are mere foreign bodies, which the economy does its best to get rid of." The following are M. Perrin's final conclusions:—"Alcohol may unreservedly be stated not to be an aliment, because—1. It exists unchanged in the blood; 2. no trace of its transformation or destruction can be discovered; 3. it is eliminated unchanged by all the excretory organs; 4. the phenomena it gives rise to, in whatever dose taken, its accumulation in the nervous system, and its well known toxical and pathogenic action, demonstrates it to be a modifier of nervous force, and negatives the alimentary character attributed to it; 5. the objection drawn from the inability to reproduce the total quantity taken cannot be received by physiologists. At most, this shows that some portion becomes lost during the peregrination of the alcohol through the economy, but it in no wise proves that it has been burnt or destroyed."

In the light of these peremptory and authoritative verdicts, how sublime or how ridiculous (for there is but one *step between* the two) is the designation assumed

by publicans in a certain document they issued in 1875. In an official report emanating from a central body of licensed victuallers, they give themselves the euphonious name of "dispensers of alcoholic food." Dispensers they doubtless are, and that on an enormous scale. Dispensers of alcohol they of course are, for however varied may be its vesture, which is as parti-coloured as Joseph's coat—whether it be red, brown, pale, or black, whether it be clear or opaque—alcohol is still the thing they dispense, and is the attractive ingredient in all their wares; and their life is devoted to its diffusion in floods, which have been computed to amount to considerable lakes, and to long full-volumed rivers, with an ardour as intense as if it were really what it has been called, *aqua vitæ*, "the water of life." Thus far the official designation is beyond challenge. But when the last word is added to round it off into the commendatory phrase, "dispensers of alcoholic *food*," we instinctively draw a long breath and sink dumb, and then moralise on man's power of cool and brazen contradiction. To show that the two words "alcoholic" and "food" agree together as fire and water do, we quote the following antithetic statements from the pen of Dr. Lees:—"Food is digested, alcohol is not. All food warms the blood, directly or indirectly; alcohol does not, for it is never decomposed in the circulation. Nitrogenous food nourishes the body, in the sense of assimilating itself to the tissues; alcohol does not. Food makes blood; *alcohol never* does anything more innocent than mixing

with it. Plastic food feeds the blood cells; alcohol destroys them. Food excites, in health, to normal action only; alcohol tends always to inflammation and disease. Food, in short, gives force to the body; alcohol excites reaction and wastes force, in the first place, and, in the second, as a true narcotic, represses vital action and corresponding nutrition. If alcohol does not act like food, neither does it behave like water. Water is the subtle but innocent vehicle of circulation, which dissolves the solid food, holds in play the chemical and vital reactions of the ultimate tissues, which conveys the nutritive solutions from cell to cell, from tube to tube, and which carries off and expels the effete matter of the frame, yet without fever or inflammation. Water neither irritates tissue, wastes force, nor suppresses vital action; whereas alcohol does all three. Alcohol hardens solid tissue, thickens the blood, narcotises the nerves, and in every conceivable direction antagonises the operation and function of water." * So much for the harmonious relations—logical, phraseological, and physiological—of the publican's "alcoholic food?"

We close this section with the following verdict, with which the *British Medical Journal* summed up discussions of this subject several years ago :—

"We have no wish hastily to speak on this important matter, but we are in conscience bound boldly to declare the logical and inevitable conclusions, as

* "Is it food or Poison?" in Meliora, Jan., 1863.

they seem to us, to which a scientific view of the subject forces us.

"The grand practical conclusions are these:—1. That alcohol is not food; and that, being simply a stimulus of the nervous system, its use is hurtful to the body of a healthy man. 2. That if its imbibition be of service, it is so only to man in an abnormal condition; and that our duty, as men of medicine, is to endeavour to define what those particular abnormal states are in which alcohol is serviceable. 3. That ordinary social indulgence in alcoholic drinks, for society's sake, is, medically speaking, a very unphysiological and prejudicial proceeding.

"We will only add, that if we wanted any stronger proof of the necessity for the inquiry we now ask for, we should find it in the arguments—if they may be termed such—of those who have taken up the defence of the bottle."

3. *Water, the True and All-sufficing Beverage of Man.*

If this be indeed the case—and that it is all experience declares—we need be at no loss what to conclude as to the claims of alcohol to the name of beverage. For alcohol seizes on water wheresoever it finds it, and abstracts it from any tissue to itself, regardless of the injury it thereby inflicts. Fire does not more summarily dispose of water than does the alcohol we imbibe, thereby defrauding the fibres and organs of the body of the sap they thirst for at every pore, and

leaving them hardened and sluggish, like what we see in anatomical preparations preserved in spirits of wine, "Having *diverse properties*," says Dr. Lees, "the two agents cannot possibly answer the *same purpose*. Alcohol not only will *not* supply the place of water in the vital tubes and tissues, but it actually *abstracts* and *displaces* that grand and beautiful vehicle of life from every part of the organism to which the great heart-pump is propelling it night and day."

Endless might be the chain of testimony to the virtues of water. Poets, and the like, shall not here be cited. It is with scientific evidence we have now to do. John Wesley, in gratefully recounting in his old age the Divine goodness vouchsafed to him in the matter of health, says, "When I grew up, in consequence of reading Dr. Cheyne, I chose to eat sparingly and drink water." Of this Dr. Cheyne, an Aberdonian by birth, we read as follows:—"In 1700, after taking the degree of M.D., he repaired to London, where he practised in winter, and in Bath in summer. From full living he became enormously fat, as well as asthmatic, and resolved on strictly adhering to a milk and vegetable diet, from which he derived so much benefit that he recommended it in all his principal medical treatises." * Among these treatises is an *Essay on Health and Long Life*, in which he says of water,—"Without all peradventure, water was the primitive, original beverage, as it is the only simple fluid fitted for diluting, moistening, and cooling—the ends of

* Chambers' *Encyclopædia*, sub. nom.

drink appointed by nature. And happy had it been for the race of mankind if other mixed and artificial liquors had never been invented. It has been an agreeable appearance to me to observe with what freshness and vigour those who, though eating freely of flesh meat, yet drink nothing but this element, have lived in health, tranquillity, and cheerfulness, to a great age. Water alone is sufficient and effectual for all the purposes of human wants in drink."*

Dr. Wilson, physician to the Prince of Nassau, says: "There is no agent applied to the human body, externally or internally, that has such influence in wakening all the vital powers to their great restorative capabilities, in arresting the progress of disease, or preventing,

* Dr. Cheyne was a prominent figure in his day in London. Mr. Timbs says, "Dr. Winter was an Englishman who loved wine, and Dr. Cheyne was a Scotchman who loved milk." Winter addressed to Cheyne some good humoured skirmishing verses, one of which is:—

Suppose we own that milk is good,
And say the same of grass;
The one for babes is only food,
The other for an ass.

To these Cheyne retorted in verses equally smart. A lady of high living, with flushed face and carbuncled nose, one day consulted Cheyne. Looking into a mirror, she exclaimed, 'Where, in the name of wonder, did I get such a nose as his?' 'Out of the decanter, madam," replied Cheyne. Dr. Cheyne was a very large man. He "weighed thirty-two stones," but "reduced himself one-third, and enjoyed good health till the age of seventy-two."—*Doctors and Patients*, vol. i., pp. 66, 67, 252.

when inevitable, a fatal termination, as pure water. Administered at various temperatures, it is the most powerful remedy we possess, the most manageable in its scientific application, the most easily obtained, and the most certain in its results. So various are the modes in which it can be applied, that there is no remedy that can be made to produce so many diversified and opposite effects, as stimulant, a sedative, a diuretic, a sodorific, a derivative, an alterative, and a cleanser and restorative in the fullest sense of the terms. Unchaining all the powers of the constitution, giving nature a general impetus, and leaving uncurbed her desire and efforts to heal; and all this without the necessity of straining any individual function; and after its most marvellous and mighty results in the most acute and dreaded diseases, leaving behind no trace of its operation, no mark or after-suffering to point out where or how its power had been exercised—a conqueror without bloodshed—the giver of sound constitutions, without levying a tribute—a divine and universal remedy —universal in its application—universally dispensed for the use of all mankind—and in days to come destined to be universally placed at the head of all remedies."

Professor Hoffman, physician to the King of Prussia, in like manner says: "Water, by its fluidity and mildness, promotes a free and equable circulation of the blood and humours through all the vessels of the body, upon which the due performance of every animal function depends; and here water-drinkers are not only

the most active and nimble, but also the most cheerful and sprightly of all people. In sanguine complexions, water, by diluting the blood, renders the circulation easy and uniform. In the choleric, the coolness of the water restrains the quick motion and intense heat of the humours. It attenuates the glutinous viscidity of the juices of the phlegmatic, and the gross earthiness which prevails in melancholic temperaments. And as to different ages, water is good to children to make their tenacious milk diet thin and easy to digest; for youth and middle-aged people, to sweeten and dissolve any scorbutic acrimony and sharpness that may be in the humours, by which means pains and obstructions are prevented; and for old people, to moisten and mollify their rigid fibres, and to promote a less difficult circulation through their hard and shrivelled vessels."*

We all know and prize the vital air, and transport ourselves whithersoever we may best find it in its normal purity. What should we think of the man who should plant himself down in some deep, dank dell, or putrid marsh, whose exhalations, let us suppose, absorbed or displaced much of the life-giving oxygen? Just such a part plays he who saturates his interior economy with alcoholic fluids that rob it of its vital moisture, and leave to the parched and paralysed organs only a dulled vitality and a languid activity. There is, there can be, no more vital element than water, being that in which our life must,

* *See Reid's Temp. Cyclop.*, 2nd ed., pp. 552-556.

without a figure, either swim or sink. Less than this affluence of water, as its floating life-element, our nature cannot brook; and more or other than this, in name of drink, it does not need. With whatever innocent concomitants combined, it is still the essential fluid; and if any man should still hesitate to take up the good song, and translate it into daily life—

> "Water for me, cold water for me,
> And wine for the tremulous debauchee,"

let him ponder this one passage more—one of the most lucid statements on the subject which we have anywhere seen—from the very valuable little work of Edward L. Youmans, of America, entitled, *Alcohol, and the Constitution of Man*:—

"The presence of this liquid is essential to all life; it is a leading constituent of every organised substance. From the lowest condition in which vitality is manifested to the highest, from the humblest moss clinging to the surface of a naked rock, upward through all the gradations of vegetable and animal life to man at the summit of the scale, every living being requires a copious and constant supply of water to maintain the vital functions. Four-fifths of the blood, and three-fourths of the brain, muscles, nerves, and tissues of all organs that make up the apparently solid flesh, consist of water. It is the vehicle of all change, the great transporter of the organised world. It courses through the animal system along countless channels, and with almost immeasurable velocity; it is the chief agent of

digestion, absorption, nutrition, secretion, and all the wonderful transmutations which take place perpetually in the vital structure.

"Our first physical necessity is for air to breathe; the second is for water to drink. So large and continual is the demand for it, that a healthy man consumes three-quarters of a ton annually; three hundred times his own weight, when he has arrived at the period of manhood. So immense a consumption requires a corresponding supply; and accordingly, we find that the provision of this liquid in the economy of nature, is on a scale proportionate to its importance. It is the most abundant of all known material substances. Its reservoirs are miles in depth, and cover three-fourths of the globe. Through the action of the physical forces, it is raised in vapour and borne away by atmospheric currents, falling condensed upon the land,—a process of regular natural distillation. The direction and extent of these atmospheric currents, laden with water, determine the distribution of living beings upon the earth. Where there is abundance of water, there life is exuberant; but where it is withheld, we find the desert.

"When we reflect upon the properties of this substance, the plenitude of its supply, the vastness of the plan of operations by which it is purified and furnished to the inhabitants of the land; when we observe in what a wonderful degree it is adapted to the grand offices it is designed to perform in the scheme of the *living world*, its perfect liquidity within a considerable

range of temperature, its neutral and passive attributes, its wide range of solvent powers, by which it changes its nature and acquires the qualities of a thousand different substances; when we consider how admirably it is fitted to carry forward that uninterrupted series of mutations, those subtle and exquisite changes, which characterise the animal organism, we are hardly able to resist the thought, that, in the order of Providence, water was created for us; and that the whole plan and policy of organised nature was adapted and conformed to its properties." Pp. 34–36.

By way of turning a refreshing jet on the dry arena of scientific discussion, we here introduce the following eloquent delineation of the virtues of water, which we find cited under the name of the great temperance orator, J. B. Gough :—

"Not in the simmering still, over smoky fires, choked with poisonous gases, and surrounded with the stench of sickening odours and corruption, doth your Father in heaven prepare the precious essence of life—pure cold water. But in the glade and glassy dell, where the red deer wanders and the child loves to play —there God brews it; and down, low down in the deepest valleys, where the fountain murmurs and the rills sing; and high up in the mountain-tops, where the naked granite glitters like gold in the sun, where storm-clouds brood and the thunder-storms crash; and far out in the wide, wide sea, where the hurricane howls music, and the big waves roll the chorus, sweeping *the march* of God,—there He brews it, beverage of

life, health-giving water. And everywhere it is a thing of beauty, gleaming in the dewdrop, singing in the summer rain, shining in the ice-gem, till they seem turned to living jewels; spreading a golden vein over the setting sun, or a white gauze around the midnight moon; sporting in the cataract, sleeping in the glacier, dancing in the hail-shower; folding its bright snow-curtain softly around the wintry world; and weaving the many-coloured iris, that seraph's zone of the sky, whose warp is the raindrops of the earth, all checkered over with the celestial flowers by the mystic hand of refraction—that blessed life-water. No poison bubbles on its brink; its foam brings not madness and murder; no blood stains its liquid glass; pale widows and starving children weep not burning tears in its depths. Speak out my friends: Would you exchange it for the demon's drink, alcohol?"

CHAPTER VI.

DOES ALCOHOL ARREST WASTE, AND THEREBY ECONOMISE FOOD?

1. *What if it did? And at what cost?*

DRIVEN from all pretension to be a flesh-former, unable to make good its next pretension to be a flesh-warmer, alcohol has yet one ignominious corner left in which to skulk, namely, that it is one of those beverages which the French called "*boissons d' epargne*,—in other words, that it is a waste-arrester, and therefore a food-economiser.

Professor Moleschott gives up its claim to "the name of an alimentary principle," but pleads for it as what he calls "a savings-box for the tissues."* Was ever client cut by keener irony than this? As young ladies say now-a-days, "Only fancy!" alcohol and savings-box named in one and the same sentence! If savings-box it be, in the sense meant, it is a very dirty one; for it is something like larder, press, pantry, coal-bunk, and ashpit all in one. That it does arrest change is true; but this, its much paraded plea, is in reality but one item in its manifold damnatory indictment. The worst service that can be done to the human system is this very arrest of vital meta-

* Quoted in *Meliora*, vol. iv., p. 44.

morphosis, such vital change being a synonym for life and health. What means industry, what means exercise, what means bathing, but the promotion of health by the promotion of natural change. "Only fancy!" the stomach turned into a salt-beef barrel, the circulation converted into a sluggish and fœtid sewer, the cavities of the body fitted up into coal-holes, the organs degraded into lazy and quarrelsome lubbers, and the brain softened into a sleeping beauty in the wood! That very plethora and floridity—ah, mocker, it is thy characteristic *rouge*, it is the very sign of the abnormal—nature's flag of distress. Unburned carbon, accumulated rubbish, anarchy, confusion, and every evil work—these are its true names.

"The nice balance," says Dr. T. K. Chambers, in his fascinating work on the *Renewal of Life* (1863), "of vital functions convenient for the use we put our bodies to, is called health or ease; that deranged balance which is inconvenient, is bad health or disease. There are no new forces to be studied." Dr. F. R. Lees states the physiological principle of the case with much pertinence and force in the following passage:—

"Life itself is constant renewal. When this truth is once mastered, the phrases, 'excess of vitality' or 'superabundance of life,' will appear as contradictions in terms. As Dr. Chambers affirms, 'There cannot be too active a renewal of the tissues; for the fresher their organic constituents, the more serviceable they are, and the longer duration they have before them.

There cannot be too close an adherence to that typical form which it is the business of the renewal to keep up, any more than there can be too exact an obedience to law and to order. *The most active renewal of the body possible is health.* The cessation of renewal is death. The arrest of renewal is disease.'

"The abstract truth may be stated in these terms. In death, decomposition goes on to its end without any renewal of the organism, so that the living form disappears. In disease, decomposition goes on, while renewal merely flags; and hence the decaying tissues are not fully expelled by the freshly formed substance; they become 'degenerate,' not regenerate,—a kind of 'death-in-life.' The microscope will furnish the concrete illustration, by showing, for instance, that the contractile fibre of an animal well exercised and fed is full, firm, and elastic, of a bright red colour, made up of parallel fibres, beautifully indented with crossings. But in the arm of an indolent man and a toper, or of a paralysed patient, the flesh has a widely different appearance—it is of a pale yellow hue, flabby and inelastic, streaking with grease the knife that cuts it. On closer inspection, dark globules of oil are observed, interspersed in the tissue. This is 'fatty degeneration,' the tendency to produce which is a striking effect of alcoholic narcotisation. It is, in short, a stage of the very same process which occurs in the sepulchre, when the corpse is converted into 'grave-wax,' or 'adipocere,' a cerous fat, the result of chemical decomposition. A few months back a Newry

doctor, in a public meeting, gravely advanced the fact that alcohol 'fattened' his patients as an apology for its use. This is the mode in which it fattens, and this is the key to its connection with heart-disease. Persons who are perpetually ignoring the essential tendencies of alcohol, by talking of 'moderation,' should mark these words of Dr. Chambers:—'Degeneration is a more or less relapse into a lower and lower form of organic life, and exhibits itself, therefore, in a variety of grades and amounts. Occurring in various parts, *it occasions three-quarters of the chronic illnesses which give work to the physician.*'" *

For these vital changes, the harmonious balance of which constitute health, the great mediating element, as we have already seen, is water. That is nature's one and all-sufficing beverage. "Water," it has been truly said, "serves as the medium by which all alimentary material is introduced into the system; for until dissolved in the juices of the stomach, food cannot be truly received into the economy. It is water which holds the organisable materials of the blood either in solution or suspension, and thus serves to convey them through the minutest capillary pores into the substance of the solid tissues. It is water which, mingled in various proportions with the solid components of the various textures, gives to them the consistence they require. And it is water which takes up the products of their decay, and conveys them, by a most complicated system of sewage, altogether out

* *Life, and How to Renew it*, pp. 7, 8.

of the system. . . . *No other liquid can supply its place;* and the deprivation of water is felt even more severely than the deprivation of food. . . Alcohol *cannot* answer any one of those important purposes for which the use of water is required in the system; whilst, on the other hand, it *tends to antagonise many of those purposes* by its power of precipitating most of the organic compounds whose solution in water is essential to their appropriation by the living body."

We are far from being indifferent to the various experiments that have been made with the view of determining what virtue may lie in alcohol, theine, and the like, to arrest waste and economise food; for it is by carefully conducted and repeated experiment that these claims are to be tested and the truth ascertained. One of the most elaborate of these isolated tests which we have heard of was that which the American physician, Dr. Hammond, imposed on his own person; but, like a prior physiologist who confined himself in a bag in order to determine the amount of spontaneous evaporation that takes place, he unavoidably slid into fallacies which somewhat vitiated his results. He set himself to test the virtue of alcohol as a waste-arrester in the three following cases:—When the weight of the body was kept uniform by a sufficiency of food, when there was a loss of weight from deficiency of food, and when it was gaining weight by an excess of food. The use of a certain quantity of alcohol in the first case, spread over five days, issued in a slight increase of bodily

weight, but with headache, feverishness, and general disturbance of health. In the second case, these evil effects, he says, were not felt, and the weight of the body, notwithstanding the deficiency of food, was considerably more than sustained. In the third case, that of the use of alcohol with excess of food, the weight was still further increased; but the general health was greatly disordered, there being incessant headache, disturbed sleep, hot skin, pulse averaging 98°, impaired appetite, and other disarrangements. The experiments were mercifully wound up by an interposition of nature, in the shape of a violent diarrhœa of forty-eight hours' duration, by which the belaboured system protested against further freedoms in that empirical line, and but for which, Dr. Hammond confesses to the belief, a serious illness would have supervened in the event of prolonged experimentation.

Whatever fallacy might lie in the experiment, there was no dubiety whatever in the response nature gave to it. With articulate voice she painfully started, and at the same time answered the question, "Be it that alcohol arrests waste, is this arrest of vital metamorphosis any advantage to me?"

This, in the present question, is the gist of the whole matter; and to this query science and experience alike answer, No. The plea that in this way food may be saved to the poor is simply ridiculous. It would be the dearest saving the poor man ever *made.* Frugal fare, ever the most healthful fare, is in

general neither scant nor dear. There is no such parsimony in the bounties of providence, or such excess of requirement to meet our daily necessities.

> "Man wants but little here below,
> Nor wants that little long."

And if there were any such scarcity of food, alcohol would be about the worst, and certainly very far from being the cheapest of substitutes.

It is vitally important, in this case, to remember, what we must therefore be permitted somewhat freely to reiterate, that life is a harmony and health a well-balanced compromise between waste and repair. Life is sustained by a continuous process of combustion. It is, without a figure, a vital flame. It goes on healthfully, just as it goes on harmoniously and cheerily. We do not like choked, smoky grates, or dim-burning gas. We prefer purity to bleariedness, without accusing ourselves of undue fastidiousness or extravagance. So with the human system. Health is just the maintenance of all those vital changes in their due measure and balance. Living and dying here meet together. In more senses than one,

> "The moment when our lives begin,
> We all begin to die."

But the dying we speak of is the very process of living. There is no muscular movement but is performed at the expenditure of some change—the disengagement of some particle from the living tissues. To spare motion and arrest these vital changes, is to live slow

in one respect, but in another it is to live fast. It is to pass out of the conditions of health into those of disease, and to hug death in the attempt to cherish and prolong life. As Dr. T. K. Chambers pointedly remarks, "Metamorphosis of tissue is life, or an inseparable part of life." Professor Carpenter thus forcibly puts the case: "While it may be decidedly advantageous to prevent the body from living too fast, and thus being worn out by its own energy, it is absurd to suppose that if by the use of any of the 'arresters of metamorphosis' we could materially retard that process, we could get as much good work out of the system as if, with an adequate supply of nutriment, there were free play given to the excretory operations by which the effete products of the metamorphosis are carried off. If we cut off the ingress of air to a stove, we diminish the combustion of its fuel, —but at the same time, and in the same proportion, we lessen the heat it gives forth."

2. *Monumental Specimens.*

From the exorbitant importance which some attach to retardation of change of tissue, it would seem as if death by inanition were a frequent casualty. We are not forgetful that such lamentable cases do occur, and that, as in Ireland a generation ago, fever dogs the steps of famine. But the diseases generated by penury proper are probably as nothing compared with those generated by excess. The very plethora which so

many mistake for strength, and the floridity which they belaud as the hue of health, are in reality incipient signals of distress. The arch-mocker makes large capital out of this alcoholic rouge. This is the fruit of arrested elimination; but is it health? We will try to believe it after we have got persuaded that to nail down our windows to keep out ventilation, and to stop up our vents to keep in smoke, are promotive of domestic salubrity. Heaven save us all from this blessedness of arrested waste!

Physiologically, the phenomenon is easily explained. M. Lallemand and his associates found globules of fat swimming in the blood after the injection of a single dose of alcohol; and it is easy to see what degeneration of the vital fluid will ensue from habitual indulgence. But there is another factor in the process. Alcohol, by its paralysing effect on the nerves, depresses the vital functions, and those of elimination among the rest. Liebig himself tells us what Prout and Fyfe, early in the century, and many since have observed, that "the use of alcoholic liquors causes a considerable diminution in the amount of carbonic acid given out."* The unburned carbon, oosing lazily in the blood, deposits itself in the form of fat when it can; and thus, like the stalled and high-fed ox, and under the like conditions, they become, as monsters of obesity and models of bulk, illustrious monuments of arrested metamorphosis.

* *Animal Chemistry*, p. 27.

This, of course, may be brought about by other causes than strong drink, as may be seen in not a few whose strict temperance does not save them from the unwelcome result. The well-known Daniel Lambert, of Leicester, attained the weight of 52 stones 11 pounds. He died in 1809, at the age of thirty-nine. Two suits of his were preserved at the inn where he died, and seven men have often been buttoned within his waistcoat. His enormous coffin had to be built on two axle-trees, and drawn on four wheels to the grave, where it took half an hour to get lowered, on an inclined plane made for the purpose. And yet this inflation was not due to drink. Lambert was an estimable and strictly temperate man. His tombstone bears the inscription—"*Altus in animo, in corpore maximus*" ("Lofty in mind, in body immense"). His case was the converse of the following:—A poor, thin ghost of a man took a long journey to consult a learned physician about his leanness, and got this edifying reply,—"Sir, there is a predisposition in your constitution to make you lean, and a disposition in your constitution to keep you so." *

But these are exceptional cases. With water-drinkers they are exceedingly rare, whereas with indulgers in fermented liquors they are as common as any sequence in nature. The aggregate consumed by many such over a series of years is perfectly enormous. Sir John Sinclair names a gentleman

* Timbs' *Doctors and Patients*, i., 253-256.

who, in twenty-three years, drank 35,688 bottles of port, equal to 59 pipes. In Wadd's "Comments" on corpulency, a Welsh squire is named, who died in 1793; he drank eight gallons of ale daily, and weighed 40 stones. The London draymen, who have the free use of the vat, will often, in summer, drink from two to four gallons of porter, or of half-and-half, daily, and not unfrequently they far exceed that amount. With what result we all know. To outward seeming could any development be more magnificent? Their gigantic forms arrest the stranger's eye, and instinctively extort from him the exclamation, "What models of manhood!" Alas! if ever the proverb held true, that beauty is but skin-deep, pre-eminently and most literally does it hold true here. Those huge forms are so many skinfuls of congested organ and tissue, in which disease finds its congenial lair, and "death holds its court." Skin-deep truly, and no more, is that florid mimicry of health and vigour; for a mere skin-deep scratch will suffice to lay these models in their grave.

The reason is not far to seek. Under that blessed arrest of waste for which so many heap boundless benediction on alcohol's head, the system becomes gorged with non-vital matter, which of course impedes and impairs the *vis medicatrix naturæ*, or self-repairing power of the human organism, on which all hope of cure depends. This phrase of the older pathologists, observes Sir Thomas Watson, "has been sneered at, but (as I conceive) very unjustly, and sometimes ignorantly;" being

"a short formulary," he adds, to denote the undoubted and benign fact "that the animal frame is, to a great extent, a self-mending machine." * But what can the best and cunningest self-mending machine ever constructed do in the curative line, when diluvial potations are daily made to sweep mud and rubbish among its gear, to clog its wheels, relax its straps, and otherwise mar its mechanism, which is much too fine and complex for us fully to understand? Need we wonder that those who indulge in such audacities of self-experimentation—as if *in corpore vili*—should find, one heedless day, that they have ventured a step too far,—that what would be a trifle to others has proved a fatality to them? "In some inebriate cases," says Dr. Grindrod, in his learned essay, "the principle of vitality is so small, that it is suddenly extinguished by little more than ordinary exertion, or exposure to unusual heat or cold; and even, as is not unfrequently the case, *by simple indulgence in a glass of cold water.*" †

To return to our London draymen, we cite the following from the author just named, in proof that their florid show of health and vigour is nothing more than skin-deep—that their "crown of pride" is like that of "the drunkards of Ephraim, whose glorious beauty is a fading flower":—‡

"The substance of the following remarks not very long ago went the round of the public papers:—

* *Principles and Practice of Physic*, i. 41.

† Bacchus 6th. 1851. p. 194. ‡ Isa. xxviii. 1.

Medical men of experience in the metropolis are familiar with the fact, that confirmed beer-drinkers in London can scarcely scratch their fingers without risk of their lives. A copious London beer-drinker is all one vital part. He wears his heart upon his sleeve, bare to a death-wound, even from a rusty nail or the claw of a cat. The worst patients brought into the metropolitan hospitals are those apparently fine models of health, strength, and soundness, the London draymen. It appears that when one of these receives a serious injury, it is always necessary to amputate, in order to give the patient the most distant chance of life. The draymen have the unlimited privilege of the brewer's cellar. Sir Astley Cooper, on one occasion, was called to a drayman, a powerful, fresh-coloured, healthy-looking man, who had suffered an injury in his finger from a small splinter of a stave. Suppuration had taken place in the wound, which appeared but of a trifling description. This distinguished surgeon, as usual, opened the small abscess with his lancet. Upon retiring, however, he ascertained that he had forgotten his lancet case. Returning to recover it, he found his patient in a dying state. In a few minutes, or at most in a few hours, the unfortunate man was a corpse. Every medical man in London, concludes the writer of this statement, above all things, dreads a beer-drinker for his patient in a surgical case.

"In another popular publication, a remarkable instance of this kind is recorded, in confirmation of the

above case. 'Some forty years ago there flourished in London a drayman of huge proportions, a regular beer-bibber, known by the name of Big Ben. Ben was reckoned one of the strongest men within the bills of mortality, and he was occasionally seen showing off as second in those prize boxing-matches which used to delight our moral and intelligent ancestors. When stripped of his upper garments, and engaged in the attitudes of this brutalising sport, seldom or never had there been exhibited a frame so robust, or one which promised better to endure the shocks which might assail it. "There stands," you would have said, "an invulnerable giant; death will certainly find it no easy matter to level him." Yet for all this apparent hearty strength, Ben was brought down by an injury which would not have scathed a child. One day his hand received a slight graze from the wheel of a passing carriage on the crowded street—the skin was only ruffled. Ben wiped away the starting blood, and thought no more of the matter. In one week thereafter Big Ben was in his grave.'

"Mr C. Edwards, in reference to the same class of men, remarks,—'The whole cellular substance is infiltrated with fluid; they are walking specimens of general dropsy. I have repeatedly witnessed diseases and accidents occurring in this class of persons. Their diseases are always of a dangerous character, and, in case of an accident, they can never undergo even the most trifling operation with the security of the tem-

perate. They almost invariably die under it, or it is followed by delirium tremens, erysipelas, typhus fever, mortification, and death.' " *

Sir Thomas Watson says he knew a publican, near Newmarket, a great eater and drinker, who thought he might indulge *ad libitum*, and keep down obesity by exercise, and by Epsom salts twice a week, which only increased his appetite. Failure in business mercifully compelled hard work and harder fare, and within a year he had shrunk to 14 stones, much to the benefit of his health. Sir Thomas infers from this that "the *kind* of food has much more to do with the production of obesity than the quantity," and quotes Mr. Banting approvingly, after summarising his well-known tale.

Early in the present year (1877) the *Daily News* thus recorded the death of the "Buckinghamshire giant," who fell, pierced by "five arrows," in the prime of his days:—"On Friday last, William Stevens, known as the Buckinghamshire giant, a man who weighed 35 stones, and who was about 6 feet 8 inches high, died, at the age of forty-nine, at the 'Five Arrows, Waddesdon,' near Aylesbury. He was formerly a farmer, and went to reside with the landlord of the 'Five Arrows' about four years ago, at which time he only weighed the moderate amount of 18 stones. From that time, however, he devoted his life to eating and drinking, swallowing everything that was put before him, and only varying this

* *Bacchus*, ed. 1851, p. 194.

amusement by getting into the scales to please the farmers and hunting gentry of the neighbourhood, when they felt any curiosity as to his progress in the fattening line. He appears to have been kept on the premises by the landlord as a kind of show to induce people to visit the inn; and a photograph was taken of him two days before his death which will perhaps be largely purchased by those whose extraordinary taste led them to supply him freely with the food and drink, more especially the latter, which caused, no doubt, his comparatively early death."

Let not our models of florid manhood take it amiss if we add the following case of a fellow-model of the feline species,—a case faintly alluded to in a preceding page. Some years ago the *Observer* newspaper thus dilated on the case:—"A melancholy death is reported in the Scotch papers. An immense cat, the property of a hairdresser in Princes Street, Edinburgh, breathed his last a few days ago. This animal was, it is stated, one of the sights of Edinburgh, was a model of beauty, and was the king of cats. So highly was he esteemed by his fellow-citizens that he was not permitted to take part in the cat show the other day in London, it being considered that, in consequence of his extreme obesity, the journey would prove too fatiguing for him. About a month ago he began to show signs of failing health, and was removed from the shop to the private residence of his owner, in the hope that change of air might prove beneficial. *These hopes, unfortunately*, were not realised. His

illness increased daily, and it was found necessary to call in the aid of three veterinary surgeons, who, for the last few days of his life, prescribed a teaspoonful of port wine to be taken every quarter of an hour. All that skill and science could do for him was done, but it was of no avail; he died last Tuesday, aged fifteen years and a half. A *post mortem* examination revealed the fact that too much fat was the actual cause of his death. Far be it from us to say one word that could add to the pain of the bereaved hairdresser, but we cannot help regretting that the cat was allowed to leave this world in, it is to be feared, a horrible state of intoxication."

3. *The Leicester Pamphlet.*

A notable exposition of this theory of seeming economy of food by parsimony of organic refuse appeared, in 1861, in the form of a lecture delivered in Leicester, which soon reached a second edition, and found influential trumpeting in the *Saturday Review.* It bore the title of *Ale, Wine, Spirits, and Tobacco*—a quaternum of "good fellows well met." * Its date was coincident with that of the Parisian results. Its principle was that which had borne sway in the imperial name of Liebig during the

* *Ale, Wine, Spirits, and Tobacco:* a Lecture delivered before the Literary and Philosophical Society, January 7th, 1861, by John Barclay, M.D., F.R.C.P., &c. &c. London, 1861.

previous twenty years, and which the Parisian results, published about the same time, now completely overthrew. It appeared, therefore, as a voice dying away in the wilderness, as a link connecting a new future with an old obsolete past. In the preface to the second edition notice is taken of those experiments, but only to give them the go-by. What else could the author do? The lecture had been compacted on a principle which these experiments could not mend, but only mar; and, as Carlyle says of his "Cromwell," to ungird a cask and take asunder its staves when they already hang together for better or for worse, is what no cooper will recommend.

The author does not spare teetotalism. His text is "true temperance," by which he means moderation. To the question, What is moderation? he first candidly answers, "I cannot tell you;" and then oddly refers us to "our own conscience" as "a correct and infallible gauge given us by the Almighty." Dr. Anstie is more explicit, weighing out moderation for the day by ounces, and not many of them either. And in this he is more philosophic; for after the second glass has followed the first, and the third the second, the enemy is already in the citadel, and conscience and the will are fast getting nerveless, or worse. Dr. Barclay thinks that temperance fanatics are too "excitable" to drink. He knows how many more are either too excitable, or too phlegmatic, to abstain.

To come to the doctrine of the pamphlet: it is,

"that alcoholic drinks in moderation are real savers of food, and indirect producers of vital force, and are thus to be considered as proper 'alimentary matter'" (p. 17). Tea and coffee and chocolate are all put into the same category. The twenty-six millions annually spent in these last named beverages is thus philosophically accounted for. Like alcohol, they are so liberally consumed because they *save food!* "Tea limits very much the loss of weight" entailed by "insufficient diet." Coffee "protracts remarkably the decomposition of the tissues." Then turning to the great German, he says,—"Liebig tells us how temperance families, depriving their servants of beer, gave them compensation in money; but they soon found that the monthly consumption of bread increased so strikingly that the beer was twice paid for, once in money and a second time in bread." Admirable! Smother away your servant maid's appetite in her own unburnt carbon and other refuse, and you will save half her food. "We thank thee, Saxon, for the word." Better testimony we could not have. Our facetious foes have long caricatured the genus teetotaler as a set of lean, wan, and sickly sparrowbills. We have now done with all that. Even Timothy's stomach may rest undisturbed, unless it takes a food-saving qualm by discovering, in the light of this food-saving philosophy, that it ailed by being extra keen, and needed Paul's prescription to assuage its extravagant energy. The Liecester physician and Baron Liebig being witness, teetotal stomachs are the strongest. Behold, does it not stand written

in their own bakers' and butchers' bills? Frugal mistresses complain that servants' wages, like other wages, have got to be high. Comfort, good ladies; drug your maids well with beer, and you will save something on their food. True, nothing is here said of the price of beer, or of the possible decrease in the quality and quantity of Mary's work, or of possible increase in doctors' bills. And it would be only prudent in householders to take due pains and compute whether the money cost of food plus beer will be really less, or the money value of the work got out their servants will on this system be more.

These facts are so refreshing that we gladly resume till our physician tells us a few additional. He says,—"The Peace Congress was held at Frankfort, and the landlord of the Hotel de Russie, a magnificent establishment there, found that every day there was a shortcoming of certain dishes, farinaceous dishes and puddings especially. In such an establishment the occurrence was a scandal, for the cuisine of that hotel is famous even in that region of inexhaustible tables d'hôte. Liebig attributes this excessive consumption of pudding to the fact that most of the members of the Peace Congress were also teetotalers, and what they lacked in wine they had to make up in pudding" (p. 19). All honour to those vigorous sons of peace! They can strike dismay into the heart of the most magnificently furnished tables d'hôte. With such pudding-eating powers, could they not conquer the *world?*

Dr. Barclay indeed adds, "Now it is impossible to say that wine is not food, *if it replace pudding*, and if pudding is necessary to replace wine; and if wine be in any sense food, it is not poison." But the reader will at once perceive that the supposition which we have signalised by italics ("if it replace pudding") is an "if" only, a supposition only, or, to say the least, is the very thing that Dr. Barclay required to prove. The conclusion which most sensible people will be disposed to arrive at is, that wine in most cases simply displaces pudding without replacing it, by disarranging the stomach and imparting only false and factitious strength.

Such is the doctor's terrible indictment against total abstinence. The thunder-cloud has melted into a very "rain of gentleness," and burst in nothing else than blessings on our heads. Seriously, this is the oddest gospel of health we ever knew. No quack could well go farther. It saves money in food by paying twice as much in beer, and paying more away in health than money can represent! It promotes the comfort and salubrity of the organic house by closing up vents and windows, in order that smoke, dust, and malaria may roll through every room, and sicken the inmates out of their appetites by dint of dirt and bad air! The great blowpipe in this inflating process is beer and its congeners, and the accruing fatness is got up, like the drunkard's enlarged and purpled nose, regardless of consequences and regardless of expense!

If we dwell yet a little on this Leicester pamphlet,

it is not because of its public importance—for it must now be well-nigh forgotten—but solely because it presents a favourable setting for our teachings on this vaunted arrest of waste, and may tend to relieve their dryness by a few touches of human sympathy.

Grateful and refreshing to us as the murmur of mountain streams is Dr. Barclay's doctrine of the physiological action of cold water. It is for this reason that we request our readers to accompany us yet again into this charming little oasis in his ratiocinative desert.

He refers to "the more recent investigations" on the action of alcohol, by which, of course, he does not mean the late Parisian researches—of the existence of which he was not then aware—but a series of not very edifying or decisive experiments (as we humbly beg to opine) on the power of different substances to arrest or increase metamorphosis of tissue. He quotes a string of authorities, headed by the eminent "Professor Donders," as all agreeing to teach "that water, when taken in excess, 'increases the interstitial metamorphosis of tissue.'" Lest this formidable phrase should trip up the plain reader, it may suffice to explain that it means the change of structure constantly going on in all the parts, by means of the vital current bringing fresh particles, charged with oxygen, to supply the various tissues, and receiving in exchange the effete matters into the circulation, to be vitalised anew or expelled. "Now this action," says the *doctor*, "*is directly* and rapidly *increased* by water,

when taken in excess (Dr. Böcker took seven pints daily). All the excretions of solids and fluids are rendered very much greater, and to supply this waste it is necessary to consume a considerable quantity of food" (p. 20). On behalf of the accused element, we own the soft impeachment, and we are hardy enough to love it all the more on that account. Professionally, we are neither a prophet, nor a prophet's son; but from our own commonplace experience we can testify that its character and achievements are very much what are here described. "The necessity for food," adds our author, "keeps pace with the metamorphosis of the tissues, which are, as it were, washed away by the water, which can only be looked upon as extravagance." How it is to be "looked upon" is a question that may stand over at present. Our more immediate concern is to accept and testify to the fact. If this tissue-changing propensity of water be a crime, then the element is doomed, for the proof, we fear, is but too conclusive. For our part, we should, if cited and sworn, be constrained to testify that it had repeatedly washed away from our interior economy many a crudity and abnormity that would otherwise have operated effects more interesting to the studious pathologist than to ourselves. Many a time and oft, in the bracing morning walk, as we quaffed it fresh from the wayside fountain, has it conspired with its brother revolutionist, the country air, to "wash away" the obstinately lingering morsel from the stomach, or the heavy odour from the breath, and sent us in with

ruddy cheek and whetted teeth, to perpetrate, in name of breakfast, that sin of "extravagance" which here fills the doctor with such serious concern.

But soberly, we must be permitted to ask, before handing over water to the executioner, is this appetite-creating quality which it notoriously possesses so very deadly a crime? Is mother earth—hitherto our exuberant and unfailing nurse—so seriously in danger of becoming sterile? Is her soil chemically exhausted? Then where, in that case, is even the alcohol to come from, which requires, every one knows, immensely greater quantities of cereals to produce it than are needed to produce food? Or have Professor Donders and his scientific confrères discovered everywhere in the earth literal springs and reservoirs of the pure mountain dew?

Moreover, may we be permitted respectfully to submit whether this *donder*-headed doctrine be not a complete inversion of all the great maxims of hygiene, popular and scientific? Has it not been a doctrine, gentle reader, most surely believed by you from your youth up, that the ability and propensity to eat well was a good physical sign, and that health came and went as appetite waxed or waned? If the disappearance of frugal and wholesome fare before the apparatus of well-whetted powers of digestion be an "extravagance," we venture to say it is one which many a valetudinarian for himself, and many an anxious parent for his child, would give any sum to incur. It *is such an* extravagance, in short, as the Author of our

being has ordained, and which nature in her frugal prodigality will ever enable us to uphold.

So very evident is all this, that the doctor here anticipates and answers a twofold rejoinder:—"But I am sure to be asked, 'Is not this very "metamorphosis of tissue" only a hard name for life?' It is. 'Is not the most rapid metamorphosis of tissue the highest form of life?' I answer again, Yes" (p. 20). He then proceeds to qualify this admission by expressing the belief that if we had no other object or care but so to feed ourselves as to prolong life to the utmost, we might eat like a butcher or green-grocer, and drink water like a hydropathist. But this, he avers, is mere animal existence. The "enormous appetites at water-cure establishments" is gross animalism. Before that deluge of water-drinking the brain and nervous system are "washed away!" Insanity often ensues; and where the thriving patient does not become an idiot, he is sure to become an ox!

It is almost incredible that such things should be gravely taught. It is a painful fact that many shatter their brain and nerves, and even bring on insanity, by simply neglecting to cultivate the animal, and that hydropathic and similar methods are now their only chance. Who needs to be told that defective or inharmonious nutrition is the evil, that the due cultivation of the animal all over restores the physiological balance and re-invigorates the man? How can nutrient means that are good for all other parts be bad for the brain? That vital organ is nourished and repaired by

food and rest, as truly as any other; so that the perfection of the physical is the best setting and vantage ground for the intellectual and the moral, in order that we may realise the proverbial ideal of "a sound mind in a sound body." Liebig himself being witness, and all sound physiology along with him, active metamorphosis of tissue is the very condition of health, the very element of organic life. It is with many the very definition of life. Any arrest put upon it (obvious cases excepted) is a step out of health, and the arrest put upon it by alcohol is the worst arrest of all.

Dr. Parkes says:—"When beer is taken in daily excess, it produces gradually a state of fulness and plethora of the system, which probably arises from a continual though slight interference with elimination both of fat and nitrogenous tissues. When this reaches a certain point, appetite and the formative power of the body is impaired. The imperfect oxidation leads to excess of partially oxidised products, such as oxalic and uric acids. Hence, many of the anomalous affections, classed as gouty and bilious disorders, which are evidently connected with defects in the regressive metamorphosis." *

This precious parsimony of tissue is in every sense the dearest economy of all. The well-known American temperance reformer, Dr. Jewett, of Boston, when asked, on a very public occasion,† if "the presence of

* *Practical Hygiene*, p. 258.

† At Sixth National Temperance Convention, held at Cleveland, *Ohio, July 29* and 30, 1868. See Proceedings, p. 57.

alcohol in the human body prevents the waste of tissues," promptly and spiritedly replied, "'Prevents the waste of tissues!' It does to a certain extent. It stupefies the fellow so that he cannot use his muscles or brain. Wherever you develop power, you waste tissue; if you develop thought, you waste brain. When a fellow is dead drunk he saves his tissues. Toads have lived in rocks one hundred years; but who wants to live a toad's life for the sake of saving his tissues? I don't want to save my tissues. I want to go to my table every day, and have it well spread with substantial food, and incorporate the vegetable compounds and make them a part of Jewett, and then I want to use up the energy in advancing the glory of God and promoting the good of mankind. This idea of saving tissues is all a humbug."

CHAPTER VII.

Is Alcohol a Stimulant?

1. *Dr. Anstie's Definitions and Views on this Point.*

We have well-nigh completed our exhaustive analysis of the reputed virtues of alcohol; and it has thus far been a destructive analysis. We have interrogated chemistry, physiology, experience, only to find it established, beyond all dispute, that it is as impossible for the assimilative energies of the system to build up the tissues out of the materials laid to its hand by alcohol, as it was for the enslaved Hebrews to make bricks without straw, or as it would be for a builder to rear a house without brick or stone, or for a man to clothe himself in trews off the kilted limbs of a Highlander.

But with all this, many important questions remain to be settled. Though alcohol might be incapable of building up the tissues from its total lack of any nitrogenous element, might it not still be useful as fuel, or to arrest waste, or in some mysterious way to give force. No; not in any wise. Loath to give up their client, its patrons have yet one plea more to urge,—may it not at times be useful as a stimulant? and may not this be reason enough for including alcoholic fluids of the milder sort in the category of wholesome beverages? "Talk not to me," exclaimed a very clever man to us once, "of the little nutrition there is in alcohol; when

a temperance advocate holds out on a knife or spoon the few grains of nourishment to be found in a bottle of fermented liquor, it has no effect whatever on me, for I do not go to these beverages for actual nourishment; I have plenty of nutritious food of the solid kind at hand for that; I use these drinks for refreshment, as exhilarating beverages, and that is all the vindication they need, or that I care to offer." While plausibilities of this sort were current, and found only too much support from the maxims and precedents of medical prescription, it was perfectly clear that a hard battle and sore discouragement awaited the temperance advocate.

Physiological definitions seldom admit of being sharply cut all round. Define to the quick such terms as "food," "poison," "medicine," "stimulant," "sedative," and a point will be reached where it is hard to determine whether the definition contains too much or too little. On no one of these terms is there more of confusion and delusion than on the word "stimulant." As a medical writer justly remarked a quarter of a century ago, "The so-called sedatives, acting through the blood in the higher nervous centres, almost always commence their operation by stimulating these centres; and the so-called stimulants almost always produce a subsequent sedative effect; so that it is not easy to determine whether the two classes of medicine can be separated."* It is now pretty well understood that

* Simon, *Lectures on Pathology;* ap. Anstie, Stimulants and *Narcotics, p. 2;* Comp. Billing, pp. 73, 74.

the charm of alcoholic stimulation, disenchanted of its witchery and translated into grim physiological prose, means the vitality or force suddenly called to the front by way of revolt or recoil from a venomous outrage on the organism. It therefore comes too late, for the enemy is there, and the blow is struck before it comes at all. Hence the exhilarative stage is a mere dance on the dizzy precipice; and those who hold that, up to a certain point, alcohol is a true and honest stimulant (the only territory it can now dispute), tell us that that flush of spurious stimulation is the sure token that true stimulation has ceased and nerve-paralysis begun. This note, among others, the *Saturday Review*, in its well known articles some years ago, caught up, and very articulately echoed to the four winds. "From the moment," says Dr. Anstie, "that a certain degree of saturation of the blood is overpast, and the so-called 'phenomena of excitement' commence, stimulation is entirely at an end, as we may plainly perceive, from the fact that the nervous system, in all its parts, is becoming paralysed. The first warning of alcoholic inebriation is flushing of the face—an occurrence which indicates that the cervical sympathetic is becoming paralysed; this is a sensation not peculiar to the action of alcohol; but when caused by this narcotic, is always a sign that paralysis of the hemispheres is commencing. It is about this period, or soon afterwards, that the drinker finds himself in unnaturally high spirits;"* leading to garrulity, credulity, tomfoolery, or gross

* *Stimulants and Narcotics*, p. 187.

animalism, in which, according to the maxim, *in vino veritas*, the secrets of character leap out, as the sentimentalist melts into maudlin tears, the ferocious navvy "pounds his wife to a jelly," and the amiable "pigeon" lays himself a willing sacrifice on the gambling altar. "The apparent excitement of the emotions and desires is, in truth, but the unveiling the lower part of our nature, which is more or less ready in each of us to spring into action when the customary checks are removed."* Dr. Anstie elsewhere extends his statement to "narcotics of every kind," as "exerting on the nervous system a continuously devitalising power."† Hence, in summing up his argument, he says, "Narcosis, being a purely paralysing process, does not fall within the number of remedial agencies, properly speaking," though admissible for anæsthetic and other temporary purposes. He claims for narcotics, however, a "real therapeutic effect," under the character of "a true stimulation," when employed "in proper medicinal doses." He further lays down the important principle that "when a particular symptom, *e.g.*, pain, can only be relieved by narcotic doses of any drug, the medicine is probably altogether an improper one for the case;" another stimulant, and especially food, being usually preferable. Finally, he denies that true "stimulation thus employed is followed by a depressive recoil."‡

In asserting the claim of alcohol to be, in medicinal

* *Stimulants and Narcotics*, 190.

† Ib., *p. 258.* ‡ Ib., pp. 279, 280.

doses, a stimulant, and in recommending it in a particular case, Dr. Anstie candidly says, "I confess that I hesitate to order its employment by any but a person of great intelligence and firmness of mind, on account of the almost invincible tendency which patients have to overdo any remedy which they fancy will avert some terrible danger—a measure which, in the case of alcohol, might have the disastrous effect of leading to drinking habits."*

2. *Other Authorities.*

Dr. T. King Chambers, in his *Clinical Lectures*, says,—"What is a stimulant? It is usually held to be something which spurs on an animal to a more vigorous performance of its duties. It seems doubtful if on the healthy nervous system this is ever the effect of alcohol, even in the most moderate doses and for the shortest periods of time." In the *Medico-Chirurgical Review* for July, 1861, he says,—"To recapitulate, we think that the evidence, so far as it has yet gone, shows the action of alcohol upon life to be consistent and uniform in all its phases, and to be always exhibited as an arrest of vitality. In a condition of health it acts in some measure immediately on the extremities of the nervous system by direct contact, and is also carried through the universal thoroughfare of the circulation to the brain. To nerve-tissue chiefly it adheres, and testifies its presence by arresting the functions of that tissue

* *Stimulants and Narcotics*, p. 433.

for good or for evil. The most special exhibition of disease is in the special function of the nervous system, the life of relation, to perform the duties of which the devitalised nerve becomes inadequate. Then the vegetable life suffers; the forms of tissue become of a lower class—of a class which demands less vitality for growth and nourishment—connected fibre takes the place of gland, and oil of connected fibre. The circulation retains, indeed, its industrious activity, *but receives and transmits a less valuable, less living freight*, and thus *becomes the cause as well as the effect of diminished vitality.*"

Dr. Edmunds, of London, in a lecture, very aptly observes:—"What do we understand by a stimulant? *A stimulant is that which gets force out of a man without putting it into him.* A man who talks of getting on better with work upon a little stimulant should understand what his words mean; he is taking that which gets strength out of him without putting it into him, but when he takes food he supplies himself with force. In the one case he is living upon the food, and in the other he is living upon his constitution. If you give a tired horse a feed of corn, he goes on briskly, and you know that he will go any number of journeys, provided you give him proper food and rest, but if you stick a spur into him he will also go on more briskly. That is a stimulant. The spur, as you know, gets the strength out of him, but does not put it into him."

To the same effect, Dr. Lees says, in his discussion *with Dr. Browne*, "I am not disposed to deny, that

stimulants which act upon the nervous system *may just put matters straight*—for a fair action—any more than I would deny that a spur or whip, which act upon the nervous system of a *lazy* horse, may just put matters straight for a *fair start.* All I say—and all I understood Professor Carpenter to say, is—that spur and whip are neither hay, corn, nor water. They are stimulants. Nor will I deny that in men there is an "inscrutable" and cumulative "force"—all that is needed to be affirmed is, that neither experience, nor analogy, nor science authorises us to believe that this force comes into the organism by violence, or except by the appointed laws of nutrition and vitality; or that *alcohol* can or does generate or increase it."

The same writer, in another place, cites the following among other medical authorities, confirming the position, that whatever stimulation may lie in alcohol means ultimate enervation:—

"Dr. Archibald Billing, M.A., in his *Principles of Medicine* (4th ed., 1841), thus enforces the same truth,—'Tonics give strength, *stimulants call it forth.* Stimulants excite action, but action is not strength. On the contrary, over-action increases exhaustion.'

"Dr. E. Smith, in his experiments recorded in the *Philosophical Transactions* for 1859, says,—'It greatly *lessens muscular tone and power.* There is *no* evidence that it increases nervous influence, whilst there is much evidence that it *lessens nervous power.*'

"Professors Lallemand and Perrin, a year later, *state the same* truth amongst their experimental con-

clusions: '*Muscular power is weakened*, and (in extreme cases) extinguished.'

"The late Dr. W. Brinton, Physician to St. Thomas's Hospital, in his great work on *Dietetics*, says,—'Careful observation leaves little doubt that a moderate dose of beer or wine would in most cases *at once diminish the maximum weight* which a healthy person could lift. *Mental acuteness, accuracy of perception*, and *delicacy of the senses, are all so far opposed by alcohol*, as that the *maximum* efforts of each are *incompatible* with the ingestion of any moderate quantity of fermented liquid. A single glass will often suffice to *take the edge off* both mind and body, and to reduce their capacity to something below their perfection of work.'

"Prof. E. A. Parkes, M.D., F.R.S., in his Government *Report on the issue of a Spirit Ration during the march to Coomassie*, reaches this conclusion: 'The *reviving effect* produced by alcohol after great fatigue, and the power thus temporarily obtained of *continuing* the exertion, if necessary, is well illustrated by the evidence. But this gain is only for a time, *and is followed by increased exhaustion;* for, to use the common phrase, alcohol is a stimulant merely, *and not a renovator*, in the sense of supplying materials to exhausted tissue. This can only be done by food and rest.'

"Lastly, I cite Dr. Henry Maudsley, one of the greatest authorities on the subject of lunacy, and the Professor of Medical Jurisprudence in the University

College,—'If men took careful thought of the best use which they could make of their bodies, they would probably *never take alcohol, except as they would take a dose of medicine*, in order to serve some special purpose. . . . *Like the pawnbroker or the usurer, alcohol is a present help at the cost of a frightful interest;* and if the habit of recurring to it be formed, the end must be a bankruptcy of health. It is not possible to escape the penalties of weakening the will; sooner or later they are exacted in one way or another *to the utmost farthing.* It is not possible, on the other hand, to overrate the advantages of strengthening the will by a wise exercise; the fruits of such culture are an unfailing help in time of need.'—(*Responsibility in Mental Disease*, 1874, pp. 285, 286.)"

To these I add some racy illustrations from an able lecture by the Rev. Hugh Sinclair Paterson, M.D., of London, entitled, *Stimulants and Strength:*—"A gentleman travelling in Ireland was astonished to find that in his bill of daily expenses there was one frequently recurring item, 'Refreshment for horse, twopence.' 'What is the meaning of this?' he inquired. 'O sir,' was the reply, 'that is for whipcord!' If that is what you mean by stimulation, I am prepared to admit that alcohol is a stimulant. If refreshment or stimulation is whipcord—something to excite the force into action that is in the human system—I may be prepared to admit the analogy, only however, with a certain qualification. *When you have the* horse in hand, and between the

shafts, and apply the whip, you can make him go in any direction that you wish. But in the human system, can you tell what direction the action of alcohol will take? The doctor may thereby liberate force, but can he direct it when he has done so? He summons 'spirits from the vasty deep;' but when they come he can't send them back again, neither can he control them, and they very frequently do far more mischief than they can possibly do good." Again, he says,—"On a certain occasion a gentleman was talking about his horse. He said he could not get it into a right state at all. He had tried all kinds of specifics, 'condition powders,' and all the rest of them in vain, and bystanders were wondering what he would do next, when a little stable-boy asked, 'Sir, did yez ever try corn?' If people would just really try food —such food, using the word in a large sense, as is adapted to their condition—not drugs or drink, but food for increasing their strength or maintaining and recovering it; if in battling with disease they would try the natural means that God has connected with bodily health, they would find that method wonderfully successful" (pp. 8, 12).

In the light of these authoritative utterances, we can readily discern the dubious claim that alcohol has even to the name of stimulant. Dr. Edmunds, in a paper read at the British Association in 1873, pronounces it a narcotic, and declares "those so-called stimulating effects of alcohol in small doses," which furnish such capital to Dr. Anstie, to be nothing more

than "really finer shades of narcotisation disguised by efforts on the part of the system to excrete an injurious substance, and to compensate for its disturbing influence." Dr. Lees thinks "narcotic" a name open to exception; he thinks it true, but not the whole truth. The Rev. Dr. H. S. Paterson seems to hit the mark very nearly when he submits the name "irritant narcotic" as fairly covering all the phenomena of alcoholic action.

New and important light has been thrown on this question of alcohol as a stimulant by the important researches of Dr. B. W. Richardson on the whole question of alcohol. Some general observations of his on the subject may here be fitly introduced. "We learn, then," he says, "in respect to alcohol, that the temporary excitement it produces is at the expense of the animal force, and that the ideas of its being necessary to resort to it, that it may lift the forces of the animal body into true and firm and even activity, or that it may add something useful to the living tissues, are errors as solemn as they are widely disseminated. In the scientific education of the people no fact is more deserving of special comment than this fact; that excitement is wasted force, the running down of animal mechanism before it has served out its time of motion."

This makes a clean sweep of the popular delusion that alcohol gives strength. When persons say "they are being kept up by stimulants," remarks Dr. Richardson, "*they* mean actually that they are being kept

down." They are simply the victim of temporary sensations. "The evidence is all perfect that alcohol gives no potential power to brain or muscle." For a time its subject may be "briefly brilliant," as a blaze is brilliant, but issues in swift desolation.

On muscular force alcohol is unmistakably injurious. "I find," says the same writer, "by measuring the power of muscle for contraction in the natural state and under alcohol, that so soon as there is a distinct indication of muscular disturbance, there is also indication of muscular failure; and if I wished, by scientific experiment, to spoil for work the most perfect specimen of a working animal—say, a horse—without inflicting mechanical injury, I could choose no better agent for the purpose of the experiment than alcohol. But, alas! the readiness with which strong, well-built men slip into general paralysis, under the continued influence of this false support, attests how unnecessary it were to put a lower animal to the proof of an experiment. The experiment is a custom, and man is the subject."

One thing is noteworthy: Medical men, as the rule, have now come to defend alcohol as a stimulant only when given in medicinal or very small doses. Whether even this be quite wise, let medical men decide. Decide as they may, they must still regard alcohol as a mere drug; and with this we, for our parts, are perfectly content.

CHAPTER VIII.

Is Alcohol a Poison?

1. *What Constitutes a Poison?*

That alcohol is a poison is by many stoutly denied. They contest every inch and coigne of vantage; and when cornered up beyond evasion, they will still insist that it is one thing in a pound, and quite another thing in an ounce.

And yet the common sense of mankind has crystallised the unwelcome truth in that firmest of all amber—language. The word "intoxication," in its descent into our own and other modern languages, from the Greek through the Latin, literally denotes the act of poisoning, or the state of being poisoned. It will avail nothing to appeal from etymology to conventional usage. Conventionalism may indulge what freaks it chooses. It may give black the name of white, and north the name of south. But etymology still remains to tell its own unvarnished tale, and no conventional sophistication can ever obliterate its testimony. It is notorious that men who love the drink are rich in expedients to gild or sweeten the poisonous drugs by such artifices of euphonious and lubricose phrase as "support," "tonic," "nourishment," and the like. *To soften down* "intoxication" or "poisoning" into

something less or else than itself, though truly an ugly and angular morsel to lick smooth, is only another variety in this ingenious game of self-delusion. Even this attempt is but partially successful; for professional men, at least in France, freely use such phrases as "arsenical intoxication," "iodine intoxication," and even "purulent intoxication," to denote poisoning by these respective agents.* As war is carnage and duelling murder, call them by what name you may, so to be intoxicated is both actually and literally to be poisoned.

What experience has thus enunciated science has confirmed. That alcohol is a poison is not only a scientific verity, it is a scientific commonplace. This, in our mad tampering with the deadly thing, we may find it hard to realise; but it is nevertheless most strictly, yea, tritely true. It rests on the testimony of every authority competent to pronounce. There are those indeed, who, pleading for moderate drinking, would limit the truth to this formula, "the excess is poison;" but as they add that this holds "as truly in the case of the wine as in the case of the water,"† they simply trifle, for then arsenic taken in small medicinal doses that did not kill, would forego its claim to rank as a poison, and beef eaten to a degree of surfeiting that proved fatal would then cease to be

* See Dr. Carpenter's *Use and Abuse of Alcoholic Liquors*, pp. 9, 10.

† See *Ale, Wine, Spirits, and Tobacco*, by John Barclay, M.D., 1861, p. 16.

food. A thing though the most tenacious of its identity, as alcohol proverbially is, would then be itself in one degree, and something else than itself in another degree. When arsenic, as administered by the physician, does not kill but cure, does that make it any the less a poison? Nay, is it not because it is a poison that it is so potent as a drug? "All our most powerful medicines," says Dr. Carpenter, "are active poisons, and derive their potency from the very alteration in the vital processes, which, when carried too far, become fatal."

Such a drug is alcohol. In true scientific parlance it is a poison; and to cite authorities for this position with any prolixity would be needless parade. So crass, however, is the crust of prejudice we here encounter, and "so thick a drop serene" obscures the vinous vision, that it becomes needful to array a few to put the matter beyond doubt. We shall cumber our list with hardly a name but what will be found to carry in it an undisputed title to speak for all the rest.

We shall not sophisticate ourselves with catch-subtleties as to where precisely to draw the line between foods, medicines, poisons, stimulants, and other things, on which, as Dr. Billing long ago remarked, "a great confusion of languages and ideas has prevailed."* Dr. Anstie, however, by no means helps our perplexity by the remark,—"Indeed, it is hardly too much to say, that we cannot state with certainty of any food, that it

* *First Principles of Medicine*, 3rd ed., p. 73.

may not also be a medicine and a poison; nor of any poison, that it may not also be a medicine and a food, under some circumstances."* He has been referring to common salt and iron, as in small quantity essential articles of food, but as in large quantity positively poisonous. But surely the small extent in which these inorganic substances enter as constituents of the human body need not complicate distinctions which are in other respects so marked. The question whether, in determining poisons, we should not, in addition to the purely qualitative, apply also this quantitative test, is certainly interesting and important; but we leave its solution to those who are competent to deal with it.

Almost any of our best toxicologists may be cited for a satisfactory and compendious definition of a poison. Dr. Alfred Swaine Taylor says,—"A poison is a substance which, when taken internally, is capable of destroying life without acting mechanically."† This is brief and intelligible. To the same effect Dr. Guy says,—"A poison is any substance or matter (solid, liquid, or gaseous) which, when applied to the body outwardly, or in any way introduced into it, without acting mechanically, but by its own inherent qualities, can destroy life."‡

Such definitions do not apply with absolute precision; but no definition of poison does or can.

* *Stimulants and Narcotics*, p. 8.

† *On Poisons in Relation to Medical Jurisprudence and Medicine*, 2nd ed., p. 9.

‡ *Forensic Medicine*, 3rd ed., p. 332.

Though the general conception of a poison is distinct enough, it is not easy to embrace it fitly in a definition.

As respects classification, none could be more unmeaning than the old division into mineral, vegetable, and animal poisons. Orfila with much more expressiveness arranged them into the four classes of—1. Irritants; 2. Narcotics; 3. Narcotico-acrids; and, 4. Septic or putrefying poisons. Dr. Alfred S. Taylor proposes another classification, into irritants and narcotics, ranging the former under the heads of mineral, vegetable, and animal, with divisions and sub-divisions; and the latter under the heads of cerebral, spinal, and cerebro-spinal. The classification generally adopted as most convenient, is into three—Irritants, narcotics, and narcotico-acrids. It is to this third variety, which combines the malignity of the first and second, that alcohol belongs.

2. *Testimonies of Scientific Men that Alcohol is a Poison.*

Sir Robert Christison, late Professor of Materia Medica in the University of Edinburgh, who studied in Paris under the eminent toxicologist Orfila, and whom Professor Miller of the same university says,—"We know no higher authority, either as regards poisons or the articles of the Materia Medica," gives the following damnatory verdict:—"The sedative action of alcohol on the brain constitutes it *a powerful*

narcotic poison. For its effects as such, if rapidly brought on by a large dose, *there is no antidote known* —the only efficacious treatment consisting of speedy evacuation of the stomach, and the employment of brisk external stimuli."* Sir Robert further says,— "Professor Orfila found that alcohol is a violent poison, when injected into the cellular tissue, and that it produces through that channel the same effects as when taken into the stomach." Professor Miller himself says, with a terse emphasis not to be mistaken: "Alcohol *is* a poison. In chemistry and physiology *this is its proper place.*" Professor Reignault says,—"Concentrated alcohol acts as a poison on the animal economy, and will produce death when taken in large quantities. Injected into the veins it produces almost sudden death, *by coagulating the albumen of the blood.*" Professor Youmans says,—"Alcohol is universally ranked among poisons by physiologists, chemists, physicians, toxicologists, and all who have experimented, studied, and written upon the subject, and who, therefore, best understand it." Professor Carpenter, in his *Physiology of Total Abstinence*, amply testifies to the same effect. Dr. A. C. Lees says,—"All writers on Materia Medica now rank alcohol among the most powerful and fatal of narcotic vegetable poisons." Dr. Gordon says,—"It would be difficult to find a more destructive poison than ardent spirits." Sir Astley Cooper says,—"I never suffer ardent spirits in my house, thinking them evil spirits; and if the poor

* Prof. Miller's Alcohol, p. 23.

could witness the white livers, the dropsies, the shattered nervous systems which I have seen as the consequences of drinking, they would be aware that spirits and poisons are synonymous terms." Dr. Ure, in his *Medical Dictionary*, with reference to the name *aqua vitæ*, denounces alcohol as *aqua mortis*, "the water of death."*

3. *Poisonous Action of Alcohol.*

It may further help to pierce the crust of alcoholic prepossession in so many minds if we follow our authorities into a few illustrations of the poisonous action of alcohol. By its fruits ye shall know it. As early as 1679 M. Courten amply and interestingly illustrated the deadly effects of alcohol by injecting it into the crural veins of dogs. Dr. Percy, as we have already seen, in his *Experimental Inquiry* of 1839, records the result of repeated experiments on the same domestic animal. He introduced doses of alcohol of from two to six ounces into the stomachs of five several dogs, by means of a tube, with varied but very marked results, in some cases causing almost instantaneous death, and attended with such rapid absorption, that alcohol was found in the brain a few minutes after death in quantity sufficient to dissolve camphor, and to burn with a blue flame. Dr. Pereira, in his *Materia Medica*, says that "alcohol acts on plants as a rapid and fatal poison;" and then he proceeds to illustrate its similar action on

* *See Reid's Temperance Cyclopœdia*, 2nd. ed., pp. 21-23.

animals. He says,—"Leeches immersed in spirits die in two or three minutes. Their bodies are shrivelled or contracted, and before death they make but few movements; the head and tail of the animal are drawn together. Fontana found, that when half the body of a leech was plunged in spirit, this part lost all motion, whilst the other half continued in action." He then cites Fontana, Flourens, and other eminent physiologists as experimenting with the like results.

As respects the human subject, the numerous cases in which alcohol, imbibed in quantity—say, for a wager—causes either instant death, or coma that deepens into the last sleep, speak trumpet-tongued as to the mortal character of the alcoholic virus. Dr. Percy's experiments clearly proved that it is instantly absorbed by the veins of the stomach, and carried to all parts in the circulation; and with all the more fleetness and fatality if there be no food in the stomach to break the force of the invasion. That fasting dog of his that received only two and a half ounces of alcohol gave but one piteous howl and fell lifeless to the ground. So in man. If taken in quantity, alcohol, instantly absorbed, and fastening on the nerve substance, for which it has such affinity, acts in him, says Professor Miller, like a blow on the head or a kick on the stomach. Prussic acid is not more deadly. In cases where the indulgence is more gradual, but continuous, the poisoning process will shape itself accordingly. The nerves that vitalise the organs of respiration being paralysed, the breathing is laboured, and

the blood, already corrupted, courses sluggishly along. In the pithy words of Professor Miller: "The man is choking gradually, as if with a rope round his neck, or a clot of blood in his brain. The hand of alcohol is on his throat; breathing becomes slower and slower, the heart beats more and more faintly, the body grows cold, and in no long time all is still in death."* How many in this way, after a public dinner, or other convivial occasion, are put in bed to snore heavily their last sleep, and be found next morning cold and dead.

The principle of "elective affinity," which we explained in a former page, according to which the materials of all the various tissues are severally drawn out of the circulating life-fluid by special local affinities, operates in the case of persons as well as of foods.

After showing that alcohol forms no exception to the operation of this law, Youmans, in his excellent little work, thus proceeds:—"It is to the apparatus of sense and thought, and reason and responsibility, the nervous system, and especially its great centre, the brain, that alcohol is first attracted after it has entered the circulatory system; and this mechanism, the soul's consecrated instrument, affords the chief theatre of its ravages. Were some inferior organ of the body, whose functions are of a purely physiological or chemical nature, the prominent object of alcoholic invasion, the attitude of our question would be greatly changed. But alcohol is specifically, and to all intents and purposes, a cerebral poison. It seizes, with its disorgan-

* *Alcohol*, p. 25.

ising energy, upon the brain, that mysterious part, whose steady and undisturbed action holds man in true and responsible relations with his family, with society, and with God; and it is *this fearful fact that gives to Government and society their tremendous interest in the question.*" *

4. *Slow Poisoning by Alcohol.*

But should these fatal results not directly follow, either suddenly by shock, or soon by coma, let not the indulger bless his soul, and say, I have escaped poisoning by alcohol. He may be all the while poisoning himself after the most tragic fashion which it is possible for him to adopt. The reckless fool who at rare intervals drinks himself diluvially within an inch of his life, and then recovers, is a sage, and a model of health, compared with the senseless sot who goes on day after day sipping and soaking himself like a sponge, till he becomes thoroughly alcoholised, and every fibre in his body becomes a horse-leech that cries, "Give, give!" No man that ever lived, though he had a thousand horse-power of constitution, could ever eliminate alcohol that daily invaded his system by "a continual dropping" like this, not to name more copious floods; and is it to be imagined that the poisonous thing will remain and worm himself through the system without doing its deadly work? "The effect of a poison on different parts of the body," says

* Youmans *On Alcohol*, pp. 89-92.

Dr. Guy, "is directly as their absorbing power." Shortly after he says,—"The stomach may, however, become accustomed to poison, and grow nearly insensible to it, as happens with the spirit drinker. It should, however, be borne in mind that even those poisons to which the system most readily adapts itself produce permanently injurious effects. Thus alcohol causes disease of the lungs, liver, kidneys, and brain."* And lest it should be retorted, "These evil effects may to some extent happen, but they are not poisoning," be it distinctly noted that the medical authority we have quoted positively declares that it *is* poisoning. In another part of his book he expressly heads a paragraph with the unmistakable words: "Chronic Poisoning by Alcohol;" and the paragraph itself is this: "Drunkards suffer from functional and organic diseases of all the important organs of the economy; from indigestion, with vomiting and purging, through irritation of the stomach and bowels; from jaundice, through irritation of the liver; from albuminous urine, diabetes, and other urinary disorders, through irritation of the kidney; from congestion of the brain, delirium tremens, and insanity, paralysis, convulsions, and shaking palsy,—as the effect of the poison on the nervous centres. The organic diseases induced by the prolonged abuse of spirituous liquors are fatty degeneration of the liver, kidneys, heart, brain, and spinal cord, scirrhus of the stomach, and pulmonary consumption. Dropsy is a common result of the organic dis-

* *Principles of Forensic Medicine*, 3rd ed., p. 341.

eases of the drunkard."* Could Pandora herself make up a spicier and better filled box?

The case, accordingly, with alcohol stands thus: If taken habitually, to the extent of soaking and tippling, the poisoning will take the chronic and dreadful form we have just seen, along some or other of the lines indicated, and in varying degrees. If taken in large quantity, it will make short work of the body, unless the body make short, sharp work with it. And yet so inveterately wed are many to the dear delusion, that we have actually heard this promptitude of elimination alleged as a proof that a substance so quickly got rid of has no title, in strict parlance, to the name of a poison. So far from this, it is the strongest living proof of the fact that physiology can give; for it is the testimony of nature herself, with all the emphasis she can use, to the deadly character of the narcotic which she thus rouses herself to expel. What nature does in such cases is this:—Smaller evils she will endure, and as far as possible localise, but greater evils she seeks with all the greater energy to expel. She may not be able to do it wholly, but she will do what she can. With a low vital force the process may be slow and laboured. In other cases, the poison comes in with such power as to stun nature before she can collect herself to resist. It is so with prussic acid, one of the deadliest of narcotics, which kills in an instant; and yet even with it nature, in some rare cases, gets a chance; and then she gathers herself up and testifies

* *Principles of Forensic Medicene*, p. 528.

against it in the same way as she does with alcohol. Some twenty or thirty years ago, in Bradford, many young people were poisoned by prussic acid that had got into sweetmeats accidentally. One of their number escaped death, though she had swallowed a larger portion of the poison than the rest. How? By instant vomiting. The exorbitant quantity seems to have goaded the outraged system to expel it instantaneously wholesale, and it succeeded in doing so before any of the poison had time to take effect. Evils of less potency it may long retain, though never but to its hurt. If it sternly revolts against anything we take in, and seeks at once to extrude it, surely it thereby declares, in its loudest tone, that such thing is a dangerous or deadly intruder.

5. *An Illustration or Two.*

Considering the delusion that prevails on this head, and the many who say, Commend me to whisky, of all drinks, for it is the soonest got rid of, the intelligent reader will bear with us if we indulge in a few very homely illustrations.

To begin with an example of the milder sort. Some disagreeable person comes into our house. The entire household would rather be quit of him; but being merely disagreeable, they do not expel him, but simply tolerate him, or let him off with a few significant hints that he is a nuisance and a bore. This is one case. *Again, to pass beyond* the merely distasteful, a little

way into the dangerous, suppose a maddened drunkard or a maniac swaggers in, and perhaps, if he finds you at tea, proceeds to upset your table, thrust his hand through the face of your clock, or amuse himself at pitch and toss with your mantlepiece ornaments, the collective household would then be seen laying their heads together, if not also their hands, to cajole or jostle the critical intruder outside—though not even yet, probably, with very desperate violence, as if it were a matter of life or death. But, transcending this case also, suppose a furious bear were to enter, or a deadly snake, or a midnight assassin; or even that a shovelful of blazing embers were to be thrown in at a window; would not the whole household then be up as one man, all activity, arming themselves as they could, and proceed, tooth and nail, to get the deadly intruder thrust out or despatched? Imagine now that a neighbour steps in, next morning, and after hearing the adventure, sagely observes: "Well, after all, that bear could not be very ferocious, or that snake very venomous—(as the case might be)—it was so speedily despatched; or an assassin (if assassin it was) cannot be a very dangerous member of society—he was so speedily repelled; or (if it was the case last-named) a few shovelfuls of fire thrown in through a window, must be a very harmless visitation—it was so speedily gathered up and extinguished." What would be your reply? Probably something to this effect: "Fool that thou art, canst thou not see that it was the very fact that the intruder was so dangerous and deadly

that made us strain every nerve to rid ourselves of his intrusion?"

The application of this case needs no lengthened elucidation. The house supposed is the economy of the human body, with its doors and windows—pity it is that the windows should often be so dim, and the doors so ill-guarded! The household are all the beautifully sympathetic and co-operating organs. The intruder is alcohol, a murderous ruffian, who is bear, serpent, assassin, and flaming fire all in one; and so soon as he shows his ugly face, instantly the alarm is sounded within, and throughout every chamber all are up in arms; for already the villain is in the veins, careering through every passage, smiting the lively, tender nerves on the head, burning, wasting, disharmonising, wherever he goes; and behold, that valiant defender, the heart, pumps furiously to get him driven to the gateway of the lungs; and the kidneys, and the very skin itself, do their best to thrust him out, just as he came in, without waiting for preliminaries, or holding any parley with him whatever.

And as, after a desperate conflict, the victorious combatant—victorious though he be—will be prostrate and feverish, with perhaps a good few scratches which will not heal up in a moment, so, in those cases of debauch where the aroused system is victorious, and the effects of the indulgence pass off, they do not so entirely pass off but that there remain, as the best result possible in the circumstances, extreme prostration, feverishness, headache, low spirits, and disinclina-

tion to all exertion. The conscience, too, will be aroused, and will be plying its whip of scorpions—if not, it will be the more a pity! In any case, there will be a very uninviting and vinegar countenance; and the temper will be as short as the countenance is long, and will pay its special respects to the victimised wife, if a wife there be; nor will the wretch's irritability be any the less but all the more that she is the victim, and he the transgressor, who has in all respects the wrong end of the string.

And having gone so far, we may be permitted to add—let the wife note this, and not say *too much*, at least at that stage; a continual dropping, or interminable deluge is no pleasant thing at any time, but least of all if the man is saying all the while in his heart—it is true—too true—provokingly true! And let man, wife, and every soul remember that the best sweetener to the temper is good conduct, and a good conscience.

We add an illustration from Professor Miller, to which we are enabled to add an odd practical sequel. He says,—"The drug (alcohol) is a good drug; but, taken as food, most perilous. 'A bull in a china shop' is a common proverb, illustrative of similar evil. The bull, of himself, is well enough, and may indeed be a highly respectable animal in his own place and way; but in a china shop his presence is wholly unsuitable, and likely to prove most disastrous. And even so it is here. The alcohol is a 'good creature' as a medicine, and as such can be made to do good service to

humanity; but, as food, let it get into our pantries, among our breads and beefs, and then the crashing of china, under the taurine influence, will be but a faint symbol of the evils manifold, physical, social, and moral, which may and do accrue from such unfortunate misplacement."

In such a contingency, only one small hope remains, namely, to get the bull extruded as quickly and quietly as possible, and thus minimise his desolating pranks.

Strange to say, not long after perusing the above, a literal case of "a bull in a china shop" met our eye in one of the provincial prints. The *Ayr Advertiser* (January, 1861) contains a graphic account of "the somewhat novel pranks of a fine four-year old Galloway bull," named "Jock," by which the inhabitants of Newton-Stewart were thrown into no small alarm. After a number of adventures and preliminary visits, the first being to a church and manse, "he dashed across the street to a delf shop, which he entered, to the entire consternation of a large crowd which had by this time assembled, and were in momentary expectation of hearing a fearful crash amongst the crockery; but, singular to relate, he succeeded in wending his way through the delf-crowded limits of the place without breaking a single cup, plate, or anything else of the brittle ware, and passed into an adjoining apartment, and thence to the kitchen, where some vegetables being on the table in course of preparation for the 'broth,' Jock merely tasted the turnips *en passant*,

and walked out into the garden, from whence it was deemed more advisable to coax him out at the other end from the one he entered by, and which was accordingly done." After tracing, in like manner, his subsequent adventures, the writer naturally adds,—"It is not a little astonishing that a bull should have made so many visitations in the town without doing any damage; and certainly we never knew of an instance of the kind before, especially in a china shop, where his peregrinations were obliged to be of an angular nature." It is not less astonishing that alcohol should be permitted to do so many mad pranks, with so few fatal results; but the explanation is the same—the efforts made by the human system to get it as promptly as possible expelled.

CHAPTER IX.

The Force-Generating Pretensions of Alcohol Tested by Experience.

1. *Science and Experience.*

No popular notion is more widely spread or inveterate than that alcohol gives force; and so long as it bears sway, so long will the habitual use of the drug continue. And yet, by whatever test tried, it is of all notions the most demonstrably fallacious. There are just the two tribunals of science and experience to which the appeal is to be made, and the verdict of each is positive and express.

As respects science, we have amply seen that alcohol, for aught that has yet been shown, is not even used in the body as fuel; while for building up tissue it is demonstrably as unfit as would be a morsel of granite. But even were it the best of fuel, it is yet powerless to give force; for, as Liebig says, "All experience proves that there is in the organism *only one* source of mechanical power; and this is the conversion of *living tissue* into lifeless, amorphous compounds." The force to be replaced, then, is that which comes in living tissue, not in fuel. "It is only," says Professor Carpenter, "by supplying *plastic material* for the production of the nervo-muscular tissues, whose

conversion back to the state of dead matter is the immediate source of animal force, and by supplying fuel to keep the heat of the body up to the standard best fitted for its organisation, that food can be translated into force." Mere heat, then, has no force to give. But no one now pretends that alcohol can give anything more than heat; and there yet lacks proof that it can give even that. As a generator of force, science pronounces it an impostor or a charlatan.

Turning now to experience, we could more than occupy our entire space with authentic facts corroborative of this verdict. Name any trying condition of life in which alcohol proffers its services as a cherisher or invigorator, and in each case it will be found a convicted mocker. We shall classify a few.

2. *What Alcohol can do for us under Bodily Exertion.*

In this case, the only show of evidence in its favour is the temporary impulse communicated by the glass of ale or wine to renewed effort under fatigue; but science promptly replies that this is not strength ministered by alcohol, but merely strength given up by the system itself out of its reserved capital under the scourge of alcohol, just as a horse makes violent draughts upon its reserve of strength under the whip. So far from giving us strength, alcohol, in that case, robs us of it by whipping us into the prodigality of paying away our capital, instead of leaving us to renew our waste by food or rest, and frugally leave our capital

unimpaired. And what little relief alcohol thus induces us to give out of our own resources, is not only very temporary but mischievous and delusive. "Stimulants," says Sir Benjamin Brodie, "do not create nervous power, they merely enable you, as it were, to use up that which is left, and then they leave you more in need of rest than before." * Dr. Parkes still more minutely states the philosophy of the case. After describing some careful experiments of his own, in which small dozes of alcohol given to a man "destroyed the power of work," he thus instructively adds the rationale as follows:—"The reason was evidently twofold. There was, in the first place, narcosis and blunting of the nervous system—the will did not properly send its commands to the muscles, or the muscles did not respond to the will; and, secondly, the action of the heart was too much increased, and induced palpitation and breathlessness, which put a stop to labour. The inferences were, that even any amount of alcohol, although it did not produce symptoms of narcosis, would act injuriously by increasing unnecessarily the action of the heart, which the labour alone had sufficiently augmented. I believe these experiments are in accord with common experience, which shows that men engaged in very hard labour, as iron-puddlers, glassblowers, navvies on piece-work, and prize-fighters during training, do their work more easily without alcohol." † He of course

* *Psychological Inquiries*, p. 14.

† *Manual of Practical Hygiène*, 4th ed., p. 280.

admits that in emergencies alcohol may impart for a brief space the high pressure that may be required, but this is no real exception that, as such, proves the rule; it is only an apparent exception which obeys and illustrates the rule. Desperate cases may warrant desperate remedies; but firm as adamant remains the rule (as expressed by Dr. Parkes), "after great fatigue to let the heart and muscles recruit themselves by rest; to give digestible food, but to avoid unnecessary and, probably, hurtful quickening of the heart by alcohol." *

Professor Carpenter, some years before he became an abstainer, got the following from a gentleman with whom he was intimate, who also was not an abstainer, so that the testimony is beyond all suspicion of fanatical bias:—"That gentleman had once the command of a merchant vessel from New South Wales to England, which had sprung so bad a leak soon after passing the Cape of Good Hope, as to require the continued labour, not merely of the crew, but of the officers and passengers, to keep her afloat by the use of the pumps during the remainder of her voyage, a period of nearly three months. At first the men were greatly fatigued at the termination of their 'spell' at the pumps, and after drinking their allowance of grog would 'turn in' without taking a proper supply of nourishment. The consequence was, that their vigour was decidedly diminishing, and their feeling of fatigue of course increasing, as our physiological knowledge would lead us

* *Manual of Practical Hygiène*, 4th ed., p. 280.

to expect. By the commander's direction coffee and cocoa were substituted for the grog; a hot 'mess' of these beverages being provided, with the biscuit and meat, at the conclusion of every watch. The consequence was, that the men felt inclined for a good meal of the latter, their vigour returned, their fatigue diminished, and after twelve weeks of incessant and severe labour (with no interval longer than four hours), the ship was brought into port with all on board of her in as good condition as they had ever been in their lives."*

Professor Carpenter mentions that, on a visit to Messrs. Boulton & Watts' celebrated factory at the Soho, Birmingham, he saw a herculean workman at the heaviest and hottest of the work, wielding a ponderous hammer for the welding of two metals, and asked him what liquor he drank. He replied by pointing to an immense vessel in a corner filled with water mixed with oatmeal, to which the men went and drank *ad libitum*. This simple beverage was found to be not only safe and refreshing, but most invigorating, and it was greatly relished by the men.†

This reminds us of Benjamin Franklin's experience as a water drinking printer, when he worked more, and carried double, as compared with the beer-bibbers around him :—"They wondered," he says in his *Autobiography*, "that the water American, as they called me, was stronger than themselves, who drank beer. We had an ale-house boy who attended always in the

* *Physiological Errors of Moderation*, p. 136.
† *Physiology of Total Abstinence*, sec. 13.

house to supply the workmen. My companion at the press drank every day a pint before breakfast, a pint at breakfast with his bread and cheese, a pint between breakfast and dinner, a pint at dinner, a pint in the afternoon about six o'clock, and another when he had done his day's work. I thought it a detestable custom; but it was necessary, he supposed, to drink strong beer that he might be strong to labour. I endeavoured to convince him that the bodily strength afforded by beer could only be in proportion to the grain or flour of the barley dissolved in the water of which it was made, that there was more flour in a pennyworth of bread, and, therefore, that if he would eat that with a pint of water, it would give him more strength than a quart of beer. He drank on, however, and had four or five shillings to pay out of his wages every Saturday night for that vile liquor, an expense I was free from. And thus these poor devils keep themselves under."

Our next illustration is alike instructive and entertaining, and speaks its moral to us none the less effectually that it flows in a vein of serio-comic humour. George Easton, in his racy and interesting *Autobiography*, states that in his young days of rustic toil in the south of Scotland, he and other four stout workmen were set to work to repel the invasion of the Ewes river, which threatened to sweep away part of the public highway. It was mid-winter, and, therefore, whisky was deemed indispensable to enable them to withstand the cold and fatigue. Five gallons were

provided to start with—by no means a niggardly allowance—and the amount and frequency of the doses was left entirely to the guidance of their own physiological light. They of course took it with them as a help to duty; and the first week flowed freely with wet, with work, and with whisky. At the week's end they felt so exhausted that they had to sleep all Sunday. They unanimously resolved, on beginning the second week, not to touch spirits during the day, but to have a jolly tumbler of toddy at night. At the end of that week, though much fatigued, they found themselves in much better plight than in the week before. Again an improvement flashed upon their mental horizon, Robert Scott, one of their number, who had both mother-wit and humour, made the following suggestion as a fit beginning for the third week :—"Lads, I would advise you to drink no more of that whisky; but put it past till the job is finished, when we will employ a fiddler, and have a grand ball." So passed the next three weeks, with nothing like the fatigue they felt, even at the end of the second week; and thus, while the "fiddler" excrescence showed that they were as innocent as the child unborn of any moral, not to say teetotal, considerations on the subject, these sturdy sons of nature, by her stern and unmistakable teachings, worked out very satisfactorily the constitutional doctrine for themselves.

At Newhaven, years after, delivering an address, "a gruff-looking son of the ocean," says Easton, "who *evidently took* me for what I was not, came right in

before me, and said with an oath, "It's very easy for the like of you talking. If I had you on the northern seas, with your boots full of water, you would be glad of a glass of whisky."*

We distinctly remember, during our studentship at Edinburgh, when addressing a meeting in the same place, being plied with the very similar question,—"Tea and coffee are all very well at your fireside," exclaimed a sturdy tar, "but what are we to do in the open boat?" We had not an answer ready so prompt and pertinent as Mr. Easton, who, on that other occasion of his own, replied,—"How do you know, my good friend, but that I may be able to tell of the merits or demerits of whisky in such circumstances as well as you?" and then proceeded to detail that five weeks campaign against the Ewes, with very telling effects both on his interrogator and the general audience.

We may add a more recent incident connected with a difficult and perilous piece of work, a few years ago, on one of our leading railway lines:—"In our May issue," said the local print, the *Western Temperance Herald*, "we noticed with approbation the gratifying fact that the directors of the Great Western Railway Company had required that the men engaged in laying down the narrow gauge from Milford to Swindon should sign a document of entire abstinence from all intoxicants whilst occupied in such work. We have now the pleasure to announce the result of the experiment. We quote from a report of a general meeting

* *Autobiography of George Easton*, pp. 15-17.

of shareholders. In reply to questions, it was stated, 'that the broad gauge from Milford to Swindon, a distance of between 220 and 230 miles, was altered to the narrow gauge in the course of four weeks, without accident of any kind. The best thanks of the meeting were voted to the chairman and directors for the successful alteration of the gauge from Swindon to South Wales. The chairman (Sir Daniel Gooch) said it was very gratifying, that while the difficult operation was being done by the different officers engaged, and while 2,000 workmen were employed from four o'clock in the morning until eight o'clock at night, there had been no case of drunkenness or serious accident during the whole of that time. The only loss they had sustained was the death of Mr. Joshua Williams, one of the officers of the company, who had taken a deep interest in the carrying out of his great idea.'"

3. *Athletic Training and Effort.*

Of the many facts which smite the force-generating pretensions of alcohol point-blank in the face, no one can be more pertinent than the rules observed in the training of athletes. The one object of the discipline is to secure strength and spring—to secure, in short, the maximum of physical force. What light science can give on this head, the trainer will accept, if he can get at it handily; but he will not descend into deep wells for it, or undertake much travail in obtaining *satisfaction on* contested points of physiology. He has

a nearer and more tangible guide in experience. Doctors may differ, but experience within well understood limits keeps sternly true. In interrogating this guide, the trainer has no pre-occupation against strong drink. Considering the association of the tavern and the ring, we may safely infer that the leaning is all the other way. If, then, there had been an alcoholic law that could have given force, verily athletic force would have been sought by that law.

But how stands the fact? By every trainer strong drink is put under the ban. It is either altogether excluded, or admitted as a mere homage to dietary custom, in sips too infinitesimal to produce any sensible effect. Good blood enriching chops, blood purifying exercise, active excretion, free respiration, and due intervals of rest—these are the cardinal articles in the trainer's creed. When they do speak out on alcohol, it is in no bated breath. In a recent work of great interest, by J. Harrison, M.R.C.S., on *Athletic Training and Health*, he expresses, as a conviction "forced upon him by much observation and reflection, that alcoholic drinks are not admissible into a training dietary." The sentiments of such an authority in physical education are worth quoting. He says,—"The conditions essential to the maintenance of health, and therefore to successful physical education, are—1. Sufficient and appropriate food. 2. A due amount of exercise. 3. Pure, fresh air. 4. Sufficient rest. 5. A free use of cold water. 6. The avoidance of things which are injurious. We

must have some acquaintance with the subjects comprised under the foregoing heads before we can form a reliable system in developing our physical powers; and as none of these are more essential to health and strength than the first enumerated, this essay would be very incomplete if the subject of diet had been altogether neglected, especially as the most rudimentary knowledge of the chemistry of food is a very rare possession" (p. 55).

From this he enlarges on the scientific knowledge now attained in the chemistry of food, the comparative value of different aliments, and the bearing of each on muscular development. But intoxicating drinks find no place in this category. In other places he positively ostracises them, especially when, in giving instructions in regard to training for athletic exercise, and with reference to the dinner meal, he says,—"Either milk or water is the best drink for this meal. Abstain from sweets, pastry, all condiments (except salt), and fermented liquors of every kind. It would be impossible, within the limits of this essay, to prove that alcoholic drinks are not admissible into a training dietary, and to show that they should be considered to belong exclusively to the materia medica; this is, however, a conviction which has been forced upon the writer by much observation and reflection" (p. 93).

Wherever athletic ambition has prevailed, experience has dictated the lesson of strictest temperance. Even barbarous nations, innocent of any philosophy *on the subject* but what they directly deduced from

practical sources, have often reached the same conclusion, and embodied it in their laws. Here is one striking example relating to the ancient Germans who inhabited those Rhenish provinces where nature itself is thought to have declared as articulately as if a voice had come from heaven, that wine is both a natural and a needful beverage,—"Vinum ad se omnino importari non sinunt, quod ea re ad laborem ferendum remollescere homines atque effeminari arbitrantur:" "Wine they do not at all permit to be brought amongst them, because they are convinced that by that article men are enfeebled for enduring fatigue, and effeminated."—(*De Bell. Gall.*, iv. 2.)

This dictate of experience on the training of athletes is as old as the Olympic, Isthmian, and other competitions of ancient Greece and Rome. The very orators, if they would keep their voice, must abstain from "vinolentia." * Those ancient arenas might read a lesson to Wimbledon, where camp life is grotesquely travestied by luxurious canteens. Nothing could be more pertinent than the courtly rebuke of the Crown Prince of Germany, whose only fault to one of our military displays which he witnessed was the over sumptuousness of the menu.

Highly significant in this connection is the repeated success of the abstaining Highlandman, Angus Cameron, who has not only twice carried off the Gold Medal and Queen's Prize, but made the highest score that has yet been attained. Not that we would make too

* See Austin's *Chironomia*, p. 555.

much of such a case, but we claim in it our just share. The causes of his success were no doubt various. A rare combination of natural aptitudes must first and mainly be assumed; but among the minor causes, we have a right to affirm that his total abstinence habitudes were none of the least. As the *Daily Telegraph* said of him, in 1866, "Angus Cameron, like the faithful Adam in *As you Like It*, 'never did apply hot and rebellious liquors in his blood,' and his hand was firm as a rock. Had he been given to the consumpt of whisky, he might have failed to win the trophy; a teetotaler, he has nobly earned the gold medal, and 'a cup, value two hundred and fifty pounds,' from which, let us trust, he will long continue to quaff the ebullient soda, and delicately acidulated lemonade."

It would be endless to quote the congratulatory comments on his renewed success (July, 1869). The *Times* thus describes the result:—"The moment the result was definitely ascertained, a great shout of triumph arose, and Cameron, who is, comparatively speaking, the smallest and mildest of men, was hoisted on to the shoulders of two giants—of whom one, Captain Armstrong, is the pride of the Irish twenty—and borne off in the direction of the council tent to make official announcement of the victory. . . . It was an anxious moment when Cameron's rifle was handed over to be tested; . . . but when the rifle was handed back again, with an intimation that it was 'above par,' a great and general sense of relief

was experienced. The procession was re-formed, and at every regimental camp which it passed the hero of the hour was loudly welcomed. . . . At the camp of the London Scottish, Cameron, true to his temperance principles, would not taste a drop even of the claret cup, but his supporters, who had carried him without flinching from the 1,000 yards range on the opposite side of the common, were in a position both to need and to enjoy the draught which he did not permit himself. It should be mentioned that the score of seventy-one marks now made by Corporal Cameron is the very highest ever recorded for the Queen's Prize, that of sixty-nine, which he himself obtained in 1866, having previously been considerably more than was ever gained by any other competitor. Cameron is thus, for the second time within a very few years, the winner of Her Majesty's gift of £250, together with the gold medal and gold badge of the Association."

The *London Scotsman*, after correcting a mistake which confounded Angus with another northern marksman of the name of Ferguson, gives the following interesting particulars of our friend :—"Angus Cameron is a native of and a dweller in the village of Kingussie, the capital of Badenoch. He is not yet twenty-three years of age, and has ever since leaving school assisted an elder brother in the management of a modest 'general shop.' It is pleasant to add that the 'plunder' taken from Wimbledon in 1866 enabled Angus to go into partnership with his brother. In *his native* place, as well as by all who have come

in contact with him in his shooting forays in the south, Mr. Cameron is held in high deserved respect as a thoroughly modest, unassuming, and well-conducted young man. He has been a member of the Scottish Temperance League for the last eight years, having signed the pledge, we believe, on the occasion of a visit to Kingussie of the total abstinence lecturer John Anderson, in the summer of 1861. Through temptations as strong as most men have been subjected to, he has resolutely adhered to the temperance flag. When enthusiastically proffered the brimming beaker of champagne in the London Scottish camp on Tuesday he quietly asked for ginger beer. But there was no ginger beer in the London Scottish camp."

Out of many similar illustrations we may just allude to Captain Webb, and other strong swimmers, who, in some cases of failure, owned themselves to have been less beaten by Neptune than by false reliance on alcoholic aid, and have dismissed the "mocker" accordingly with most successful results. Of pedestrians, we need only refer to one who has recently been prominent in the public prints.

The *British Medical Journal* has certainly not gone out of its way in calling attention to the dietary habits of Weston, whose extraordinary pedestrian achievements have lately been so much before the public. On no point could a medical organ feel more squarely within its province than in dealing with the *mode in which* the stomach—that root of the physiological tree—may be made, especially in testing

emergencies, to minister most effectually to nutrition and strength. There is no harder worked organ in the human body, and there is none more ungratefully and unfeelingly treated, and more cruelly oppressed. Well exclaimed the late Mr. Kettle, "You complain of your stomach, do you? Were the whole truth told, the stomach might possibly have more reason to complain of you." On it lies the triple burden, first, of generating force for the maintenance of bodily tissue and strength; secondly, of ministering, when a perverse will so rules, to luxurious indulgence both in the form of high-seasoned viands and of intoxicating drinks; and thirdly, of being laid under contribution to minister the cure for outrages against itself and the entire organism, by having forced into it no end of medicinal abominations, which often make the remedy worse than the disease, and, like the ancient anarch, "by decision more embroil the fray."

Weston evidently knew how to diet himself in view of his greater efforts. Some had prematurely declared him to be an abstainer. This, of course, is a question of little consequence except to himself. If he has not been an out-and-out abstainer, all the more weighty because the more unbiassed is his practical testimony to the safe and salubrious method. During what he regards as special and prolonged exertion—meaning continuous walking, as on the first day—Weston, according to the *British Medical Journal*, depends upon fluid food entirely, taking small quantities of *beef extract*, beef essence, and oatmeal gruel very

frequently; but when the walk is to extend over more than twenty-four hours, or when, in that case, he has "broken the neck" of his task by getting over 112 miles during the first twenty-four hours, he takes solid food at comparatively regular intervals, and not much fluid nourishment between the meals. On this walk, for example, during the second and third days he took a meal of cold beef once, and of mutton chops several times, often eating two of the latter at a time. To these he added potatoes, biscuits, bread and butter, and tea, and more than once he was heard to call for fresh supplies. Alcoholic drinks are absolutely prohibited, although certain "Guides to Athletics" slavishly adhere to the old traditional pint. In this, however, professional trainers are advancing beyond them; and to quote the practical testimony of men who ought in this matter to be beyond suspicion, it appears that there are numerous instances of publicans, at whose establishments the trainers and their charges are lodged, absolutely refusing to allow the latter to partake of any alcoholic drink, lest it should assist to prevent them from winning the match, thereby paying an unconscious tribute to the efficacy of teetotalism as a practice of prime importance in the development of muscular force. The cases of failure in subsequent matches is attributed, in great part, to the reaction from temperate regimen to indulgence after victory has been reached; and a single debauch has been found to undo *the good* effects of half a year's discipline.

It is quite unnecessary to explain that we have no interest whatever in these foolish and profitless competitions, and least of all in those of the brutal kind. But a good principle will often justify itself most triumphantly in questionable company, seeing it must be very useful and good to command the meed of a kind of witness-bearing which few will suspect of any bias in its favour.

4. *Travelling.*

The experience of travellers is strongly to the same effect. They are practical athletes—prize-seeking pedestrians in the most toilsome of all arenas—who of all athletes have need to husband their energies the best. Bruce, who explored Abyssinia one hundred years ago, says,—"I laid down then, as a positive rule of health, that spirits and all fermented liquor should be regarded as poisons, and, for fear of temptation, not so much as to be carried along with you, unless as a menstruum for outward application. Spring or running water, if you can find it, is to be your only drink." Livingstone wrote in 1852:—"I have lived on the principle of total abstinence from all alcoholic liquors during more than twenty years. My individual opinion is that the most severe labours or privations may be undergone without alcoholic stimulus, because those of us who have endured the most had nothing else than water, and not always *enough of that.*" After his discovery by Stanley, he

declared in a letter that he had known drink and the vices it engendered kill off many European adventurers in Africa. Backhouse says,—"I have travelled over hot sands, so hot that the very dogs howled with pain on treading upon them, the thermometer often at 116 degrees, and the water so bad that we had to conceal the taste with coffee; and I believe no journey of the same length was ever made with so little risk or danger. There is no single act of my life to which I look back with greater satisfaction than to the adoption of total abstinence." Waterton, who died at the age of 83, and that by an accident, and who traversed as a naturalist vast regions in South America, says,—"I eat moderately, and never drink wine, spirits, or any fermented liquors in any climate. This abstemiousness has ever proved a faithful friend." Smollett, the novelist and historian, who was also a traveller and a physician, says, in his *Travels through France and Italy*,—"The longer I live the more I am convinced that wine and all fermented liquors are pernicious to the human constitution, and that, for the preservation of health and exhilaration of the spirits, there is no beverage comparable to simple water."*

5. *Hardships of War.*

The terrible war in America between the Federals and the Confederates was signalised on both sides by

* See the Rev. Dawson Burns' able and valuable essay, *The Bases of the Temperance Reform*, pp. 182-200.

telling illustrations of the advantages of an abstinent regimen. It is only needful to name among the former, General Howard, and among the latter, Stuart with his daring troopers, and Stonewall Jackson with his invincibles. Prior to that great convulsion, illustrations of the same kind are plentiful. General Lewis Cass says,—"I have had my full share of exposures, exertions, privations, in peace and in war. I have had, too, my full share of health. I might almost say that I have enjoyed uninterrupted health, and I am, therefore, a living proof that ardent spirits are not necessary for physical endurance under any circumstances of toil and trial. It was this conviction which led me, when Secretary of War, to authorise the commutation of the ration of ardent spirits, previously issued to the troops, for the equivalent in coffee and sugar."

Long before, in the American War of Independence, Lord Cornwallis, in 1783, marched his army over more than 2,000 miles in Virginia, under extreme exposure to cold and wet, and without injury to the men. Among the causes for this, Chisholm assigns their necessary abstinence from strong drink as one and chief.

Some other illustrations of about the same period are mentioned by Dr. Parkes. One was in Jamaica, where the troops, in the rainy season, and without tents, went through an arduous campaign in "perfect health." The main secret was, that spirits were beyond their reach.

Another illustration is that of an English army, in 1804, hastening from India to join Sir Ralph Abercromby. It crossed the desert, and then descended the Nile for 400 miles. Sir James M'Grigor, in his *Military Sketches* of the expedition (p. 10) pronounces the fatigues endured in that march as unsurpassed; and how does he account for it? He says,—"The men had no spirits delivered out to them, and I am convinced that from this not only did they not suffer, but that it even contributed to the uncommon degree of health which they at this time enjoyed. From two boats the soldiers one day strayed into a village, where the Arabs gave them as much of the spirit which they distil from the juice of the date tree as induced a kind of furious delirium. It was remarked that, for three months after, a considerable number of these men were in the hospitals."*

Dr. Mann, an American surgeon in the war of 1813-14, is also cited by Dr. Parkes as testifying to the vicissitudes in the health of the men that ensued on the presence or absence of spirit rations. He says, —"It was observable in the last war, from December 1814 to April 1815, that the soldiers at Plattsburgh were not attacked with fevers as they had been the preceding winters. The troops during this period were not paid—a fortunate circumstance to the army, arising from want of funds. This embarrassment, which was considered a national calamity, proved a blessing to the soldier. When he is found poor in

* *Practical Hygiène*, 4th ed., p. 281.

money, it is always the case that he abounds in health —a fact worth recording."*

"No testimony," says Dr. Parkes, "can be stronger than that given by the late Inspector-General Sir John Hall, K.C.B." He says,—

"My opinion is, that neither spirit, wine, nor malt liquor is necessary for health. The healthiest army I ever served with had not a single drop of any of them; and although it was exposed to all the hardships of Kaffir warfare at the Cape of Good Hope, in wet and inclement weather, without tents or shelter of any kind, the sick list seldom exceeded one per cent.; and this continued not only throughout the whole of the active operations in the field during the campaign, but after the men were collected in standing camps at its termination; and this favourable state of things continued until the termination of the war. But immediately the men were again quartered in towns and field posts, where they had free access to spirits, an inferior species of brandy sold there, technically called 'Cape smoke,' numerous complaints made their appearance among them.

"In Kaffraria the troops were so placed that they had no means of obtaining liquor of any kind, and all attempts of the 'winklers' to infringe the police regulations were so summarily and heavily punished by fines and expulsion, that the illicit trade was effectually suppressed by Colonel Mackinnon, the Commandant of British Kffararia; and the consequence

* *Practical Hygiène*, p. 282.

was, that drunkenness, disease, crime, and insubordination were unknown; and yet that army was frequently placed in the very position that the advocates for the issue of spirits would have said required a dram.

"Small as the amount of sickness and mortality was in the Crimea during the winter 1855-6, they would have been reduced one-half, I am quite sure, could the rule that was observed in Kaffirland have been enforced there."

In the same Kaffir war (1852), a march was made by 200 men from Grahams' Town to Bloomfronthein and back; 1,000 miles were covered in seventy-one days, or at the rate of nearly fifteen miles daily; the men were almost naked, were exposed to great variations of temperature (excessive heat during day, while at night water froze in a bell-tent with twenty-one men sleeping in it), and got as rations only biscuit (meat 1½ lb.), and what game they could kill. For drink they had nothing but water. Yet this rapid and laborious march was not only performed easily, but the men were "more healthy than they had ever been before; and after the first few days ceased to care about spirits. No man was sick till the end of the march, when two men got dysentery, and these were the only two who had the chance of getting any liquor."

In the last New Zealand war, Dr. Neill (Staff Assistant-Surgeon) found that the troops marched better, even when exposed to wet and cold, when no spirits were issued, than when there was a spirit ration.*

* *Practical Hygiène*, 4th ed., p. 282.

6. *The Red River Expedition.*

The Red River Expedition furnishes an animating example of the triumphant style in which, under almost every extreme of inclemency and fatigue, even a large and cumbrous force can rough it out in the wilderness when its rations are purged of the mock-strengthener alcohol.

From the published narrative, one of the most interesting in print,* we find that in the spring of 1870, 1,200 men, of whom one-third were regulars, and the rest Canadian militia, started from Toronto to quell a rebellion in the Red River Settlement in the far west. The line of march, 1,200 miles, was as rugged as it was long, demanding, says Captain Huyshe, "all the means of progression known to the human race, except that of balloons." The latter half of the route, beyond Lake Superior, was the worst, presenting "a wilderness of lakes and rivers, traversed only by the Indian in his birch-bark canoe, and never hitherto attempted by any boat of European construction." The river rapids they constantly encountered caused boundless toil. At the more violent of these, especially when complicated by rocks, everything had to be unshipped and carried up the "portages"—that is, winding tracks through woods or over rocks to evade the falls—and

* *The Red River Expedition*, by Captain G. L. Huyshe, Rifle Brigade, late on the staff of Colonel Sir Garnet Wolseley, 1871. See a further account of it in *Blackwood's Magazine*, 1871, p. 64.

the boats to be dragged up by sheer strength. One of these portages was a mile long, and a part of it up which the boats had to be hauled was "a rocky hill at an angle of 45°." The men were nearly always wet —drenched to the skin by rain and wading up to their waists in the river. They had sometimes to cut roads through shaggy woods; but Colonel Wolseley describes the men as being "all as cheery as possible." And yet the toil was often excessive. "Some of the large heavy boats required thirty or forty men to get them up steep places." One portage, called the "Height of Land," was very trying to the men. "Some of the brigades were two and three days getting over this portage, working from morning till night, and the excessive severity of the labour began to tell upon the men. The way in which all ranks worked, officers and men alike, was beyond all praise. The officers vied with the men in carrying heavy loads; and apart from the respect with which the officers were treated, a stranger could not have told an officer from a private. Up early, hard at work all day, rowing or portaging from 5 a.m. till 8 p.m., with a short interval for breakfast and dinner, nothing to eat but salt pork and biscuit, nothing to drink but tea, they yet looked as healthy and cheery as possible; and when they reached Port Frances there was not a sick man among them—they had no time to be sick." Nor with all their extra toils had they any occasion to be sick. "With nothing to drink" stronger than tea, what extremes of effort, within the limits of the possible, will be too much for

brave men? This non-alcoholic dietary was the secret of the whole matter.* "The men were constantly wet through, wet sometimes for days together, thoroughly done up by the severe labour of rowing, poling, tracking, and portaging; yet they were always well and cheery, and never seemed to feel the absence of spirituous liquors. This fact speaks for itself. I trust that the time has come when the issue of a spirit ration to a British army in the field will be for ever totally abolished. The men do not want it, they are better without it, better in every way. Throughout the Red River Expedition the absence of spirituous liquors was marked by an almost total absence of crime, as well as by the wonderful good health and spirits of the men."

Captain Huyshe points an emphatic moral on the subject of spirit rations, too valuable and illustrative to be either omitted or abridged:—

"I do not hesitate to say that, had a spirit ration been issued, the results would have been very different. Take the case of trappers and lumberers in Canada—men who do harder work than any other class of men in the world; they live on bread, pork, sugar, and tea. If any one doubts the severity of the work they perform, let him take an axe and chop down trees for ten minutes, and he will find that even in the coldest weather the perspiration will pour from him. Lumberers will tell you themselves that they had rather not have whisky when they are chopping in the

* The writer in *Blackwood* strongly testifies to the same effect.

woods, and these men are not teetotalers; as soon as they get back to their homes, they get drunk on whisky. I know of an instance in the Crimea where a fine young fellow, a promising young sergeant, was tried by court-martial, and broken for being drunk in the trenches, and it was proved at the court-martial that he had drunk nothing but the double allowance of spirits which was at that time issued to our men. Can anything be stronger evidence than this of the positive evil of the spirit ration? How many men, too, in the Crimea, were tried for getting at the keg of liquor in the trenches, which always had to be kept under a sentry, and was a constant temptation to the men and to the sentry himself? I admit that, in a country where fuel is scarce, it is difficult always to get wood to make the fire necessary for tea; but this should be provided by the commissariat, and the money and transport saved by the absence of liquor would go a long way towards supplying the fuel requisite for the tea. There is nothing that is so refreshing when a man is thoroughly wet and tired as a good warm cup of tea or coffee; it is fifty times as good as brandy, rum, and whisky. The latter only warm you up for a time, and leave you colder than ever; but the effect of tea or coffee lasts much longer and leaves no vacuum behind it. There may be medical men in our army who would oppose the non-issue of spirits; it was so with the Red River Expedition: some of the medical men asserted that it was a mistake—that it would never do; but the *result* was a most perfect triumph for tea; and should

the same system ever be tried, as I hope and trust it will in the next European war in which England has to engage, I feel confident that the result would be the same. Not a man of the Red River force touched a drop of alcoholic or fermented liquor the whole way from Shebandowan to Fort Garry, except he was ill, and received it from the store of medical comforts; and there was positively no sickness, and a total absence of crime, combined with the utmost cheerfulness and good humour, while the work performed stands wholly unrivalled for its unusual nature as well as its severity. The men soon get reconciled to the absence of liquor, and appreciate the value of tea as a substitute, as the following anecdote will show:—One day we were hauling our boat over a portage; it was the middle of the day, and very hot, the portage was steep, and it was hard work. Some of the Colonel's crew of Iroquois came up to help us, to my great delight, for we were pretty well done, when a sudden jolt of the boat splashed up a little tea out of a big can that was in the stern sheets. 'Let's stop and have a drink,' said some one. No sooner said than done. The big can, which held a couple of gallons, was soon emptied, though the tea was quite hot. The men crowded round, fearful lest they should be too late to get a drop; had it been beer or whisky they could not have shown a greater anxiety, or gulped it down with more satisfaction. 'By jove! that's capital—puts new life into one,' said one of my crew, a 60th man. 'Yes,' I *replied*, '*better* than all the beer in the world.'

'Well, sir, I really think it is,' was his answer—and so it was. In hot weather, cold tea is a most refreshing and stimulating beverage; and in cold or wet weather, who has a word to say against a delightful cup of warm tea?"

The expedition successfully accomplished its object and effected its return within five months, often toiling for fifteen hours a day amid wet from heavy rains and foaming rivers, without accident, and without the loss of a single life. Colonel Wolseley thus corroborates the testimony of his acting officer: "The absence of any spirituous liquor, as part of the daily issue, is marked by the excellent health and spirits of the men, and, I may add, by the remarkable absence of crime." In an Order of the Day, the Colonel proudly recounts to the men how forty-seven car-portages were got over, entailing the unparalleled exertion of carrying the boats, guns, ammunition, stores and provisions, over a total distance of upwards of seven miles; how it had "rained upon them forty-five days out of the ninety-four, since landing at Thunder Bay;" and how "upon many occasions every man had been wet through for days together;" how there had "not been heard the slightest murmur of discontent from any one," though "no force had ever had to do more continuous labour;" and how, to crown all, "there had been a total absence of crime." The Field-Marshal added his tribute in a General Order issued in November, 1870; and if he and the other military powers do not digest the moral and purge the army of spirit rations, they

must have a high faculty for winking hard against the clearest light.

7. *The Ashantee Expedition.*

In making the transition from the Red River to the Ashantee Expedition, we pass from an inclement but invigorating to a hot and unhealthy clime. We are under the same commander, Sir Garnet Wolseley, but unfortunately not quite under the same instructions. We are thankful, however, to note progress in the right direction. Under the fallacy that a total abstinence regimen would do in the bracing air of North America,—that, as one of the soldiers epigrammatically put it, "we lived on the climate there, but here the climate lives on us,"—rum was included in the provisions, but with this important instruction—"No spirit ration will be issued except on the requisition of the medical officers; the beverage will principally consist of cold tea."

In proof of the salubrity of this regimen, the *Times* refers to a Dutch expedition to the same coast in 1869, when for two months the troops had not a single case of fever. "Their field flasks were on that occasion filled with cold coffee, and no spirits were allowed to be issued on the march. Again, we are told that in 1864 about 400 men, sailors and marines, were landed from the 'Rattlesnake,' and remained on shore for four months, with the loss of only two men. The grog shops of the station were then closed by martial law."

The Ashantee Expedition, as every one knows, was entirely successful. Professor Parkes prepared a "Report on the Issue of a Spirit Ration during the March to Coomassie," at the desire of the Director-General, which commences thus:—

"I need not refer to the gravity of the question whether, under the particular circumstances of the Gold Coast campaign, the issue of rum was desirable or the reverse. If the question could be completely answered, which is unfortunately not the case, it would be of great military importance.

"Sir Garnet Wolseley adopted in this brilliant campaign the following plan:—Rum was carried with the troops, but was only issued on the recommendation of the medical regimental officers during the march from the coast to the Prah, and on the recommendation of the principal medical officer with the forces after the Prah was crossed. When issued, the quantity was half a gill (equal to 2½ fluid ounces), and it was given in the evening after the fatigues of the day.

In seeking for evidence on the effect of this issue, I thought that the most reliable opinions would be given by those medical officers who had actually marched with their men to Coomassie, and on whom the responsibility of the issue was at first thrown."

He then names the medical officers to whom he submitted two queries as to the comparative experiences of abstaining and non-abstaining soldiers, and a third asking their general conclusion, from what they

saw in that march, as to the desirability of a rum ration. He further states that he asked the opinion of Sir Anthony Home and others, including non-commissioned officers who made the march. The first and largest of the replies is from Dr. Troup, Surgeon of the 42nd Regiment. After alluding to the previous Medical History Sheets in regard to the men, "a large proportion of whom had served in India, and suffered there from tropical ailments," and to the table he had drawn up for the use of Dr. Parkes, as exhibiting "a very favourable state of health, even under very adverse circumstances," Dr. Troup goes on to say,—

"I cannot overlook the fact that, taking the life of the soldier under every circumstance, the total abstainer or temperate man has the advantage, preserving his health better, and performing his duty better, and in his older years withstanding climatic influences which, as a younger man, upset him. Some of the soldiers recorded in the return have displayed wonderful health on the West Coast of Africa, even under extreme fatigue and exposure. I hope this table may corroborate in some degree the good that may be effected by temperance. Most of the men recorded are personally known to me. A large proportion are men of exceptionally good physique, and I feel quite sure that, with their good intentions and actions, personal good has followed, and a proportionate advantage to the State.

"My opinion all along has been the same, and our little war of 1874 has corroborated it, that while men

are careful to be temperate they are more careful in other respects, and not so open to those abuses on the line of march which in many cases open the door for disease, and in the end give rise to so much mortality and invaliding in the service. This table shows a large proportion of non-commissioned officers and old soldiers, whose experience is worthy of being recognised, and who have taken to teetotalism, some from the want of control, others from the opinion that indulgence in alcohol is hurtful, while others have taken to it from their great susceptibility to its influence, when taken even in moderation. The influence and example of such men must be all-powerful in regulating the conduct of the young men who are drafted into the service, a large number of whom, in the 42nd, come from country avocations in Scotland, born of respectable people, and many of whom, on first joining, have never indulged to any extent in drinking, and some of whom have never even smoked. This class of recruit, who has never tasted of the dissipation of a town life, can at once be recognised on the primary inspection, presenting alike a good physique and purity of respiratory and circulatory systems."

Dr. Troup further remarks: "It is a recognised fact that the Medical History Sheet will tell what the Defaulter Sheet is, and if we trace the cause we generally find it to be intemperance."

Surgeon-Major Wiles, of the 2d Battalion Rifle Brigade, makes the following candid statements, in regard to the spirit ration:—"Whilst on the march I did

not see any indication for giving it, and only gave it about three times up to the arrival at Prahsu. At Barraco, where we were halted for some time (ten days), the men suffered from diarrhœa and febricula. I thought the issue of a ration here might perhaps do good, so gave it once or twice; but finding that the result was unsatisfactory, there being more cases the next day, I stopped its issue. (This sickness I considered to be owing to the disturbance of surface soil.) On arriving at Prahsu its issue was taken out of the hands of the regimental surgeon, by recommendation, I believe, of the principal medical officer, and it was afterwards given nearly every day, or at all events whenever it could be obtained, which was nearly every day. It was generally given, by my recommendation, in the evening; but one morning, as it had not arrived the previous evening, it was given at 5 a.m. I considered at the time, and on thinking it over am now more strongly of opinion, that its issue during the expedition, instead of being beneficial, only made the men more susceptible to the malarious poison and to affections of the bowels. Of course, this is only an individual opinion, but it is an unprejudiced one, although I am far from being a follower of teetotal principles. My opinion regarding its use in West Africa was so strong that, personally, I did not take any stimulant of any kind during the whole period I was in West Africa; and during that time I never felt better, and had no sickness of any kind, and marched the whole way up and down, besides doing some amount of hard

work. My experience (derived from active service in the Crimea, India, and China) is very much against its use on active service, as I think its use renders men especially liable to dysentery and camp diarrhœa, and I think it was shown to have that tendency, especially in such a climate as the West Coast of Africa. Regarding the men's feelings, I did not find that they missed its not being issued, except when they came amongst other corps who were getting it. They cared more for the tea and lime-juice, with which they filled their bottles for the day's march."

Passing the other replies, we come to Dr. Parkes' "Conclusions." From the limited range of materials, some regiments having no abstainers and others very few, these are beset with some uncertainty. In the 42nd Regiment there were twenty-four abstainers, and the comparative result stood thus:—"The actual strength of the 42nd Regiment (including teetotalers) was 656 non-commissioned officers and men, and they gave 453 cases of sickness, or there were two admissions for every three men; the teetotalers were twenty-four in number, and gave only four cases of illness, or one admission out of every six men."

After commenting on this, he proceeds to say: "The reason of this advantage is tolerably clear; the remarkable health enjoyed by the teetotalers in India (as shown by Dr. Troup's table), and the observation he makes as to their good physique and care of themselves, prove that they benefited on the Coast by their previous good conduct and superior health; their

advantage was not so much in the abstinence at the time from the two and a half ounces of rum their comrades had, as in the condition they had brought themselves into by long-continued good conduct. The table is a singular testimony to the general advantage of total abstinence, and shows also, to say the least, that the want of the spirit ration did no harm to these men on the Coast."

Professor Parkes further says,—"All are in accord upon these points,—namely, that the amount of the ration (half a gill, or $2\frac{1}{2}$ fluid ounces in twenty-four hours) was sufficient, that it was given at the proper time—viz., after the day's work, and with or after the evening meal; and in the proper form—viz., diluted and mixed with lime-juice and sugar, or put into tea. These rules are real practical gains from this campaign, showing us at any rate the proper limits of the issue, and the best time and form in which to give it."

Coming now to the question, "Was the rum ration really necessary? did it do good? did it do harm?" With all the caution of a judge dealing in limited materials, and duly deferring to the judgment of officers, he thus balances the *pros* and *cons*, concluding his Report, as will be observed, with a valuable practical suggestion of a kind which we hope will one day make a clean sweep of the spirit ration:—

"Many of the officers found themselves in a climate which is enervating and exhausting in the highest degree, *in which* exertion is most difficult, and every

feeling seemed to crave for a stimulant. It seemed to many as if alcohol were the only thing which could enable them to do their work.

"It is not only a military but a physiological question of the highest interest, whether this desire for a stimulant felt by some officers ought to have been indulged. Alcohol would no doubt exert its usual effect; it would quicken the heart, and restore for the time the failing circulation; it would, perhaps, increase the perspiration; it would not increase, it might even slightly lessen, the temperature of the body, though so large a quantity is necessary for this that this effect cannot be reckoned upon. It might, when taken with food, increase the appetite and digestive power, and thus aid the restoration of the tissues. All this may be admitted, and when alcohol was taken within the limits of moderation (which the ration was), and in the way and at the time pointed out by Drs. Troup and Kynsey in their evidence, it can, I think, hardly be denied that it was useful to many men. But it cannot be for a moment admitted that the craving for stimulants was a proof of their necessity. The exhaustion felt on the Gold Coast was the consequence of physical conditions which nothing could alter. The effect of alcohol would have only temporarily relieved it, and, as pointed out by two witnesses, the subsequent feeling of languor would have been greater than before, and a renewed recourse to alcohol would have been *necessary.* The languor and exhaustion showed

that the climate was not fitted for Europeans; but all we know of the physiological effects of alcohol, and all the evidence of tropical service prove that under such conditions alcohol is not the remedy, but is the most faithless of helps. It could not do what is here demanded from it, and belief in it has led to innumerable deaths.

"If alcohol was useful on the Coast—and I do not deny that under certain conditions it was so—it is most important that its issue should be based on the right grounds. These are shown, I think, in the evidence I have now brought forward, which has been collected impartially and without any attempt at selection. It agrees with what is known of the physiological action of alcohol, and it may truly be said that the effects stated in the foregoing evidence might have been confidently predicated.

"One more remark of a practical kind may perhaps be allowed. The reviving effect produced by alcohol after great fatigue, and the power thus temporarily obtained of continuing the exertion if necessary, is a valuable quality well illustrated by some of the evidence. But this gain is only for a time, and is followed by increased exhaustion; for, to use the common phrase, alcohol is a stimulant merely, and not a renovator, in the sense of supplying materials to exhausted tissues. This can only be done by food and rest; and as in the Ashantee campaign the men had food before or with, and rest after the rum ration, and as the quantity of rum was within the limits of

moderation, the reviving effect was felt without the subsequent depression. But no use appears to have been made in the Ashantee campaign of one of the most valuable foods for periods of great exertion, which modern science has given us. I refer to the meat extracts, which also remove the sense of fatigue, but do so, in part at least, by supplying directly to the tired muscles the materials they want—viz., the special potash salts, and probably animal extractive matters, which have a reviving influence on the exhausted nerves. From their small bulk and consequent ease of carriage, their form, which permits of ready distribution, and their facility of digestion and absorption when mixed either with hot or cold water, they are at present the most available renovators we know of after great fatigue. They more than replace alcohol, or, if thought desirable, they can be used with it, and in this case will probably be found to lessen the increased depression which ensues when the effect of alcohol passes off. I have thought it not immaterial to call attention to these valuable agents, which seem especially adapted for use in modern war, and which, without superseding the use of the usual food, or doing away with the necessity of rest, yet give to the modern commander additional means of increasing the marching and enduring power of his troops."

8. *A Passing Word for the Public Service.*

Many years ago, when admitted on board the famous "*Victory*" at Portsmouth, and surveying with interest

all parts of the old flag-ship of Nelson, our attention was attracted to a group of tars crowding towards a centre with little vessels in their hands. On asking the cause, we were told that it was the hour for the distribution of the daily spirit ration. The announcement startled and thrilled us. The daily spirit ration! What need had strong, active fellows like these for any such daily ration? And yet there they pressed, thronging each other round that fountain as if it had been to each of them a well of life. What effects were sure to follow such daily administrations? As sure as distilled spirit is distilled spirit and flesh is flesh, the daily ration was steadily producing physical and moral aberration. It was disharmonising the living tissues, and giving them a tongue to crave the unclean and venomous thing; and so, under the name of dispensing comforts or refreshments to the men, they were taking the short and easy method of making them tipplers and drunkards, and thereby injuring themselves and demoralising the public service.

So far as the army is concerned, by the Queen's Regulations (1868) the sale of spirits in canteens is forbidden at home, but is permissible at foreign stations at the option of the commanding officer. Dr. Parkes, Professor of Medical Hygiène in the Army Medical School, in the new edition of his valuable *Manual*, testifies strongly to the evils inflicted by drink facilities on the men and on the service, and traces to this cause the vast proportion of deadly vice that fills our military hospitals, and

often cripples so materially the efficiency of the army.

"A Doctor's Log," in the *Medical Times and Gazette*, quotes a pamphlet to the effect "that in Bengal, out of 34,287 men, divided into total abstainers, temperate, and intemperate, the percentage of daily sick in each class was represented by three, five, and eighty; the deaths—of total abstainers, one; of temperate, two; and of intemperate, four per cent." The "Doctor" appropriately adds,—"Just the old story. And when one remembers the sieges, campaigns, and expeditions—for instance, to the North Pole and the Red River—my intention is to raise to the utmost protest against the spirit ration. In the revised instructions for the guidance of troops arriving at Bombay, it is stated that men will exchange their rations for liquor unless prevented." This, terrible though it be, is unfortunately too familiar in general experience to startle or even astonish. The baleful fascination of strong drink is such as to override all other appetites, even those imperious cravings that subserve the maintenance of life.

All classes, alas! are but too well tempted. Ensnarement blazes out upon them from every street corner. But no sections of the community are more cruelly tempted than our soldiers and seamen. The comparatively idle life of the former, and the roving habits of the latter, with the withdrawment of both from the influences of home, and their exposure to *demoralising* companionship, present temptations of

terrible potency, which in too many cases prove irresistible. Instead, then, of gratuitously superadding occasions and inducements for the soldier to drink, everything should be done to protect him from them.

The public service is a wide word; but conventionally it denotes the twin arms of our national defence—the army and navy. How to keep up both in requisite numbers and efficiency—that is a question that is never long in abeyance. A soldier is an expensive toy in industrial Britain, where labour is constantly in demand, and wages are high. Fierce debates have transacted themselves in Parliament over the intractable problem, how to attain the maximum of available force at the minimum of cost; and in this commendable endeavour politicians have earned for themselves the distinction of recognised army and navy reformers. That progress has been made is not to be denied; but the conspicuous feature of the whole enterprise of public service reform is, that the most direct and remunerative avenue to real and large-scale amendment has been missed or ignored.

The notorious besetment of our soldiers and seamen is their proclivity to drink, with its attendant vices, and certain damage to health, and their down-hill rush to wholesale ruin and degradation under the snares, on landing, of landsharks and crimps. Were any scoundrel to walk in and out our camps, and maim soldiers here, and poison them there, and rob

them everywhere of their small pecuniary allowance, the military authorities would take prompt and decisive account of them. But the worthies we have named in the sentence before are incomparably more mischievous. Where the supposed depredators would injure their thousands, the real depredators daily at work are ruining their myriads.

The perils to which seamen are exposed at port, and the deliberate and diabolic coolness with which they are trapped to destruction, are the most familiar of our social commonplaces. The *Daily Telegraph*, commenting on a certain inquest over one of those hapless victims, suggests to any member of Parliament to examine for himself how many sailors are in a state of either frantic or helpless drunkenness when their ship is working out of port. "It would be found," continues the writer, "that the number of such cases was enormous; that it is the common and habitual practice of seamen, after they have signed articles and cashed their advance notes, to spend every penny they possess in debauchery, and that at the very last moment, just as the vessel is working out of dock, the tipsy contingents of the crew are brought down—often in a state of semi-nudity—by their female companions, or by the crimps and boarding-house keepers, and are shovelled, flung, hoisted, or dragged on board. We fear that were the inquisitive member to pursue his researches farther, he would discover that, as a rule, a merchant ship presents, during the first twelve hours of her voyage out, the aspect of a floating

pandemonium; and that, with all the exertions of the captain, the pilot, the mates, and the ship's boys —who are generally the only sober people on board— it is little short of a miracle that the vessel gets to Gravesend without coming to grief. It is fortunate for all hands when the crew pass from the mad drunken into the dead drunken state. After a few hours of stupor spent in their bunks they arise, the fresh air revives them, and by degrees everything becomes ship-shape. Of course, we except 'temperance ships,' of which there are many, both Scotch and American, from this lamentable category; but the evil of drunkenness among sailors starting on long voyages is not the less fraught with the utmost peril both to the ships in which they sail and to themselves."

This brings us to the short and easy method of army and navy reform. The true army and navy reformers are such philanthropists as the two well-known ladies who head and speed onward the cause of total abstinence in both arms of the public service respectively, and along with them Mr. Gregson and other like-minded though less prominent fellow-labourers in the good cause. Mr. Edward Baines said, on a recent occasion, "The brave defenders of their country, in the army and navy, have been enlisted by many thousands in the army of total abstinence, with the utmost advantage to their health, morality, and religious character, both when they serve in trying climates and when exposed to the sad temptations of

home residence; and it ought to be known that for this inestimable advantage we are mainly indebted to two pious and noble-spirited ladies, Miss Robinson and Miss Weston. There are 11,000 abstainers in the army, of whom 7,000 are in India; and in the navy there are 7,000 abstaining seamen. It is the testimony of these ladies, and of all their military and naval friends, that total abstinence almost always goes along with true religion; sometimes it goes before, and at other times it follows, but the two seem to be naturally united, and stand or fall together." And these teetotalised national defenders, without taking into account their high *morale*, which is the strongest of all force, are proverbially, in the merely physical point of view, immensely superior to their indulging comrades in all trials of strength and endurance, whether on the cricket ground or in hard service, on long marches, and under extremes of climate. "Quite a number of soldiers," said an American newspaper a few months ago, "were taken out of the ranks sunstruck on July 4, but no cases occurred in the total abstinence procession, which was the largest of the whole affair, and which paraded during the hottest part of the day on the Fourth."

Surgeon-General Maclean, of Netley Hospital, who says he has there had "unrivalled opportunities of studying the effects of habitual dram-drinking on the persons of our soldiers," turns to the question of facilities, and says,—"Would that they drank less! *There* never appears to have been any lack of pro-

visions; and vast quantities of spirituous liquors fell into our men's hands at the siege of Delhi. Drunkenness became fearfully rife, entailing with it increased sickness, as well as relaxation of discipline, which it was necessary to suppress with an iron hand! We all know the stake played for at Delhi. It was the empire of India. Mark how drink put the issue in peril. Mark, also, that from the danger we were saved only by that unrivalled power of maintaining discipline which British officers have shown at all times, in all places, and under all circumstances." The "Defaulters' Book" is a standing register of these (morally speaking) barometric observations. The names of abstaining soldiers are there conspicuous for their absence. The drinkers in the army keep up the list, and in proportion as they drink and get facilities to drink. In the testimonies the abstinent men make as to the benefits of their new mode of life, they often refer to the defaulters' book as the thing with which they have parted company, and to the Savings Bank and Post Office (for home remittances) with which they have made acquaintance instead. Mr. Gregson, in his late report, remarks that it would give the temperance work in the army a great impetus if he could only parade his teetotal army of 6,000—in numbers amounting to a Roman legion—"in one mass, and have them closely inspected, man by man, and marched past in review order before his Excellency the Commander-in-Chief. We are persuaded (he adds) that for order, discipline,

and health, they would be amongst the best soldiers in the service."

The *Medical Press and Circular*, commenting on certain statistics, well remarks :—"It seems difficult to understand that these statistics can have been so long within the notice of the army administration without stimulating them to some energetic effort to abate the terrible scourge of drunkenness in the service."

In military operations abstinence never fails, where tried and trusted, to assert its superiority over the spirit ration as the soldier's friend. This some of our previous illustrations have already made plain. Many of the most noted "thunderbolts of war" have sternly abjured and proscribed intoxicants, and their legions in consequence have dared, endured, and triumphed the most. We have only to recall Cromwell's invincibles, each of whom was a deep-principled and sternly-resolved impersonation of the cause, more familiar with the exercises of the closet than with the riot of the canteen, and whose camp, instead of the ribald song, resounded with the high praises of God. Against those ironsides even the skilled generalship of a Rupert, and the unquestioned valour of the Cavaliers, broke themselves into spray. And somewhat similar were the character and achievements of Havelock's "saints."

We may safely sum up these military experiences in the words of Professor Parkes :—"If spirits neither *give strength* to the body nor sustain against disease,

are not preventive of cold and wet, and aggravate rather than mitigate the effects of heat; if their use in moderation increases crime, injures discipline, and impairs hope and cheerfulness; if the severest trials of war have not been merely borne, but more easily borne without them; if there is no evidence that they are protective against malaria or other diseases, then I can only say the medical officer will not be justified in sanctioning their issue under any circumstances."

9. *What Alcohol can do for us under great Heat.*

The evidence here is equally emphatic. Dr. Parkes, after referring to Dr. Carpenter as "having assembled the most conclusive testimony from India, Brazil, Borneo, Africa, and Demerara," goes on to say,—

"The best authorities on tropical diseases speak as strongly; Robert Jackson, Ranald Martin, Henry Marshall, and many others. It seems quite certain, also, that not only is heat less well borne, but that insolation (sunstroke) is predisposed to.

"The common notion that some form of alcoholic beverage is necessary in tropical climates is, I firmly believe, a mischievous delusion. I brought to Dr. Carpenter's notice the case of the 84th Regiment, in which I formerly served, which, from the years 1842 to 1850, numbered many teetotalers (at one time more than 400) in its ranks; and the records of this regiment show that, both on common tropical service and on marches in India, the teetotalers were more healthy,

more vigorous, and far better soldiers than those who did not abstain. The experience of almost every hunter in India will be in accordance with this.

"On this point the greatest army surgeons have spoken strongly (Jackson especially, and Martin); and yet nothing is more common, even at the present day, than to hear officers, both in India and the West Indies, assert that the climate requires alcohol. These are precisely the climates where alcohol is most hurtful.

"With regard to service and exercise in the tropics, we have the strong testimony of Ranald Martin that warm tea is the best beverage; and this will be corroborated, I believe, by every one who has made long marches or hunting excursions in India, and has carefully observed what kind of diet best suited him.

"To cite a well-known individual instance of great exertion in a hot climate, Robert Jackson marched 118 miles in Jamaica, carrying a load equal to a soldier's, and decided that 'the English soldier may be rendered capable of going through the severest military service in the West Indies, and that temperance will be one of the best means of enabling him to perform his duty with safety and effect. The use of ardent spirits is not necessary to enable a European to undergo the fatigue of marching in a climate whose mean temperature is from 73° to 80°. I have always found the strongest liquors the most enervating.'"*

The testimony of the lamented Havelock cannot be too often cited in proof of the moral and physical

* *Practical Hygiène*, pp. 279, 280.

triumphs of which troops are capable when kept from strong drink. In recounting, in his *Narrative of the War in Affghanistan*, the heroic conduct of the men in the storming of Ghuznee, he says,—"This in a great degree may be attributed to the fact of the European soldiers having received no spirit rations since the 8th of July (the place was captured on the 23rd), and having found no intoxicating liquor among the plunder of Ghuznee. Since then it has been found that the troops can make forced marches of fifty miles, and storm a fortress in seventy-five minutes, without the aid of rum, behaving after success with a forbearance and humanity unparalleled in history. Let it not henceforth be argued that distilled spirits are an indispensable portion of a soldier's ration."

Turning to the period of the Crimean War, Sir Richard Dacres, then colonel of artillery, in a letter from the camp, January 17, 1855, says,—"Since I have become a teetotaler I have gone through great fatigue in hot climates. I have crossed the Atlantic, come here, been exposed to disease and *some* discomfort (not much from my rank and situation), and I have never been sick or had even a short attack of diarrhœa. I ascribe this to water; but mind, I am a temperate eater also; never eat animal food more than once a day, no lunch but a piece of biscuit; am a very early man. Now, all these things combined enable me to do as much hard work at fifty-five as many men ten or fifteen years younger. What I began with, as an example, I now continue, as I consider I am much

better without wine, beer, &c., both in a religious and worldly point of view; and I shall continue as I am, please God, to my life's end." Sir W. F. Williams, the renowned defender of Kars, wrote to a temperance order in Nova Scotia,—"I am indebted to a gracious Providence for preservation in very unhealthy climates; but I am satisfied that a resolution early formed, and steadily persevered in, never to take spirituous liquors, has been a means of my escaping diseases by which multitudes have fallen around me. Had not the Turkish army of Kars been literally 'a cold water army,' I am persuaded they would never have performed the achievements which crowned them with glory."

10. *Under Extreme Cold—Arctic Expeditions.*

In no case is alcohol more resorted to, and in none is it more mischievous. When in addition to cold there is a lack of food, the mischief is mightily aggravated. An instance of this, which we distinctly remember from our boyhood, caused an intense sensation in the neighbourhood (in Kinross-shire) where it occurred. It was one of our "old-fashioned winters," and the roads were blocked up with snow. Men in large numbers were called out to clear them; but sufficient food had not been provided, and in the remote place, miles away from their homes, to which their operations had penetrated, it was not to be had. Whisky, however —a benefactor never far away—was obtained instead, *and freely* administered, and as eagerly grasped at, by

way of substitute. The effects were disastrous in the extreme. Some, totally unable to move, had to be carted home, with effects that clung to them for life. Over weeks, in some cases months, certain of them struggled for life, and after partial recovery, became victims to the first visitation of cholera that shortly supervened. Nor were these results attributable to habitual excess. The chief victims were temperate and reputable men. They were due simply to the action of alcohol on empty stomachs, under exhaustion and exposure to severe cold.

Our readers can hardly need to be introduced to the now famous Thomas Edward of Banff, the self-taught naturalist, who from his cradle had a perfect passion for all living things, and while earning a scanty livelihood as shoemaker for his wife and family, contrived to spend many a night long, in severe cold, in quest of specimens. Mr. Smiles, his biographer, who has so generously brought him to the light, says,—"A great point with him was his sobriety. For thirty-six years he never entered a public-house nor a dram-shop. He was not a teetotaler. Sobriety was merely his habit. Some of his friends advised him to take 'a wee drap whisky' with him on cold nights; but he never did. He himself believes that had he drank whisky he never could have stood the wet, the cold, and the privations to which he was exposed during so many years of his life. When he went out at night his food consisted for the most part of plain oatmeal cakes, and his drink was the water from the nearest brook."

Dr. Parkes, one of the greatest as well as most recent of medical authorities on this head, says,—"There is singular unanimity of opinion on this point; all observers condemn the use of spirits, and even of wine or beer, as a preventive against cold."* After citing some of these, he adds,—"The guides at Chamouni and the Oberland, when out in the winter, have invariably found spirits hurtful; they take only a light wine (Forbes). The bathing men at Dieppe, who are much exposed to cold from long standing in the sea, also find that spirits are hurtful, and take only a little weak wine (Levy)."†

In such a connection (to quote a page or two from what we have written elsewhere)‡ it may not be inappropriate to array a variety of facts and illustrations in proof of the painfully-acquired but now completely established experience of the utter inutility and positive mischievousness of a resort to ardent spirits under exposure to arctic cold. This soon began to force itself on the conviction of the earlier navigators. The most eminent of these, Parry, as we shall see by-and-by, speaks to this effect in no bated breath. Another eminent arctic navigator, in the first quarter of this century, was William Scoresby, who from the age of ten was at sea, and by twenty-one was commander of a ship. With whaling he combined arctic exploration, and in this public service he achieved distin-

* *Practical Hygiène*, p. 278. † Ib., p. 279.

‡ *Medical Temperance Journal*, Jan., 1877, ART. "The *Arctic Expedition* and its Temperance Moral," pp. 63-70.

guished success. He was a devout and pious man; and, after having given to the world several able and interesting works (including some of a distinctively religious kind), the most important of which was an *Account of the Arctic Regions*, in two volumes (1820), he studied for the ministry in the Church of England, became D.D., and crowned a life of early adventure and of scientific discovery in geography, magnetics, and other departments, by a life of devoted labour in the best of causes. In some of these writings (which we have long ago perused, but have not now at hand), and often also, as we have reason to know, in the course of his conversations, Scoresby was wont to testify, in strong and unequivocal terms, against the mischievous delusion that alcoholic fluids could impart warmth and invigoration under the chilling rigours of the Pole.

On this question few, if any, have laid both science and philanthropy under deeper obligation than Dr. W. B. Carpenter. In addition to his lucid and authoritative utterances in his own books, and in the higher class organs, on the physiology of temperance, he has, with that earnest industry which is so marked a feature in all his works, compiled a copious and valuable array of facts illustrative of the worse than worthlessness of alcohol in extremes of climate. In his prize essay on the *Physiology of Total Abstinence*, he states, in the preface to one of the later and remodelled editions (1858), that he proposes to show "that science and experience concur to prove that, so far from affording any assistance in the prolonged endurance of bodily or mental exer-

tion, of cold, heat, or pestilential air, or in the general sustenance of health, they tend in reality to depress the powers of the system." This pledge he amply redeems. His principles apart, it may be seasonable at this time to recall his leading facts.

First, he begins with himself. On a particular day (20th January, 1838—a day long memorable for its almost unprecedented severity, the thermometer standing at 24 degrees below freezing point) he had occasion to travel from Exeter to Bristol outside the stage-coach —a journey of nine hours. No alcoholic liquor did he resort to during that trying exposure. A hearty breakfast before starting, and a substantial dinner by the way, enabled him to reach his destination with no further chill than a genial fire speedily disposed of, and with no subsequent discomfort whatever.

This reminds us of the similar experiences of John M'Intosh,—experiences of a stated and prolonged, and therefore more valuable character. This man, whose life has been written, was well known in his day as the "Teetotal Mail-guard," a genus far from common under the old stage-coach dispensation. To him were entrusted the Government mails between Edinburgh and Dumfries. His generous and obliging nature made him a great favourite from the first, and the usual treatings flowed in profusion upon him. He saw, in the consciously growing appetite, on what a precipice he was standing. In the year 1831, when little else than moderation was ever heard of, and even that but *as a voice in the* wilderness, he determined to abstain

for life, and kept to his determination. When railways superseded the old coaches, he became a railway-guard, and was in all weathers as remarkable for his vigour and geniality as for his inflexible repulsion of all intoxicants. "During midnight storms, and piercing frosts of winter, while coachman and passengers were dosing themselves with liquor to keep out the cold;" and amid "the scorching rays of summer," when they did the same to keep out the heat, "M'Intosh refreshed himself with tea and coffee."* His health continued perfect, till an accident suddenly deprived him of life, to the profound regret of many a traveller, including not a few who had been brought to or confirmed in total abstinence by his counsels and example.

The Esquimaux and other Hyperboreans know well the value of their oleaginous food as a protection against starvation in both senses, and every man of moderate intelligence has physiological information enough in these days to tell the reason why. Sir John Richardson testifies, from his northern observation and experience, that "plenty of food and sound digestion are the best sources of heat," and that "a Canadian with seven or eight pounds of good beef or venison in his stomach will resist the greatest degree of natural cold, in the open air, and thinly clad, if there be not a strong wind." Navigators, who have a repugnance to fatty foods at home, came to eat any amount of it with

* *Britain's Social State*, by Bailie Lewis of Edinburgh, pp. 190, 191.

relish in those high latitudes, and even to crave it. So testified Dr. King, who accompanied Sir George Back in his search for Sir John Ross. One of Sir John Ross's medical officers, Dr. J. D. Hooker, in the Antarctic Expedition, states in a letter to Professor Carpenter,—"Several of the men on board our ship, and amongst them some of the best, never touched grog during one or more of the antarctic cruises." Many had laid in for themselves large stocks of coffee; and gladly would the others have exchanged their grog for this beverage, could they only have been assured of getting it on the requisite occasions. In that same letter, Dr. Hooker says,—"I do think that the use of spirits in cold weather is generally prejudicial. I speak from my own experience. It is very pleasant. The glass of grog warms the mouth, the throat, and the abdomen; and this, when one is wet and cold, with no fire, and just before turning into damp blankets, is very enticing. But it never did me an atom of good; the extremities are not warmed by it; and when a continuance of exertion or endurance is called for, the spirit does harm, for then you are colder or more fatigued a quarter or half an hour after it than you would have been without it."

Be it remembered that these, and other sentiments yet to be cited, belong to a very early date in the development of temperance physiology. They are not given by doctrinarians, in support of pet hobbies or fanatical theories. They are given by practical men, in the clear light of experience, and amid all the obfuscating

influence of inveterate prejudices and traditional theories to the contrary. Nay, as Dr. Hooker says above, they are given in face of the enjoyable warmth of palate, gullet, and the inner man generally, which the actual imbibition of the fiery liquid in the first instance imparts. From this we may most certainly infer that not uselessness merely, nor even injury to a moderate extent only, would have led them to abjure or denounce alcoholics, but a very smart, well-tested, and indubitable experience of their downright mischievousness in those icy zones.

This fact is all the more significant that in those years theory had lifted up its horn in very potential and authoritative forms. Those were the days of new and splendid revelations on the subject of animal heat. Liebig reigned without a rival; and one of his long unquestioned utterances (except by stray doubters) was the unproved dictum, that alcohol was a fuel, or ministrant to animal heat, by its conversion in the system, and the appropriation of its carbon; a dictum that was advanced on analogical grounds only, which have since been demonstrated to be utterly fallacious. Even then, however, honest and practical men opposed to it their clearly established experience. Sir John Richardson, the companion of Franklin in his earliest Arctic Expedition, says, in the letter he wrote to Dr. Carpenter on the eve of starting on the search for his old comrade, and, therefore, only a year or two after that new theory had appeared,—"Liebig, I believe, considers that spirits are necessary to northern nations,

to diminish the waste of the solids of the body, and that tea is less useful; but my experience leads me to a contrary conclusion. The Hudson's Bay Company have for many years entirely excluded spirits from the fur countries to the north, over which they have exclusive control, to the great improvement of the health and morals of their Canadian servants, and of the Indian tribes." On his return from his second expedition, which, most consistently with these sentiments, he succeeded in arranging on the entirely abstinent system, he strongly testified to the salutary results of that regimen, and to its marked superiority over what he knew by experience to be the effects of the grog method, even in the most moderate allowance. Dr. Kane, some time after, on his return from the American searching expedition, where he had experienced the severest cold hitherto known, that of 70° below zero, speaks in the same unhesitating terms of the incomparable superiority of the total-abstinence method. But on these American experiences we cannot do better than cite the following testimonies from a paper read at St. John's Wood, by Dr. Morton, of Kilburn:—

"The American expeditions form an episode on which it would be pleasant to dwell. 'Blood is thicker than water,' as an American admiral once said when he committed a benevolent breach of neutrality in our favour in China. The fate of Franklin excited in the United States an interest second only to that felt by *his own* countrymen. These expeditions were fitted

out at the expense of wealthy and public-spirited private individuals, the principal contributors being Henry Grinnel and the late Mr. Peabody. Of the first two, in the 'Advance' and 'Rescue,' under Lieutenant De Haven and Mr. Griffin, in 1850, I have not been able to obtain any details, but it is a significant fact that Dr. Kane, who sailed with De Haven as surgeon, should have been led to organise the expedition which he himself commanded in a subsequent year, 1853, on total abstinence principles. Here is his account of the constitution of his floating Republic:—'All were volunteers. We did not sail under the rules that govern our national ships, but we had our own regulations, well considered and announced beforehand, and rigidly adhered to afterwards, through all the vicissitudes of the expedition. These included—first, absolute subordination to the officer in command or his delegate; second, abstinence from all intoxicating liquors, except when dispensed by special order; third, the habitual disuse of profane language. We had no other laws.'

"Kane was a hero of the God-fearing type, and the record of his brave, wise, patient, watchful exertions for the safety of his crew is as affecting as it is inspiriting. The expedition undertaken under these laws was no child's play, and the dangers and hardships which the little party encountered are almost unequalled."

"It is very significant, however, that temperance principles were again adopted by Dr. Hayes, the sur-

geon of Kane's expedition, when he, in his turn, was afterwards placed in command of a similar expedition. This gentleman indeed says, as the result of his experience, in a paper quoted by Dr. Parkes, 'that he will not only not use spirits, but will take no man accustomed to use them; and that if imperious necessity obliges him to give them, he will do so in small doses frequently, as the excitant action is followed by a very dangerous reaction.'"

These are but a few witnesses out of many who, especially in America, have now grown into a whole "cloud of witnesses."

The nation long watched, with peculiar sympathy and interest, the devoted efforts of Lady Franklin herself to prosecute the search for her lamented husband. Her expeditions comprised, as may well be imagined, like-minded spirits as noble as herself. None of these were worthy of more respect than Captain Kennedy, the commander of one of the expeditions, who, on his return, attributed the exceptionally excellent health of his crew to "the strictly teetotal principle on which the expedition was carried out." No narrative of arctic experiences, for the space of it, could be more interesting than that which Captain Kennedy himself gave on one occasion when he presided at a temperance meeting in Wolverhampton. He stated that he became an abstainer in 1833, and had begun life in the service of the Hudson's Bay Company, which he left "to the ruin of all his earthly *prospects*" (as his friends mistakingly predicted),

owing to its complicity at that time in the frightful traffic of spirituous liquors that attended their operations, but which, happily, they have since abolished. He then proceeds, as follows, to narrate the fortunes of his benevolent expedition :—

"Very few, if any, people had tested the total abstinence principles to the extent to which he and his gallant crew of eighteen men had tested it during their cruise in the 'Prince Albert' in Lady Franklin's private expedition. It was owing to their observance of the total abstinence principle that, of the thirteen vessels that went out the same year as himself, his was the expedition that accomplished the most. It accomplished more than others, because the 'Prince Albert' went out at a season when no other vessel would go out; it accomplished more, in having travelled farther in one extended tract than any other expedition; and it accomplished more, because it had less than any other expedition with which to accomplish it. He wintered within sixty miles of Sir John Ross's expedition. Sir John Ross had 180 men, and he had only eighteen, yet in one journey he (Captain Kennedy) and his little crew, with stinted means, accomplished four times the distance that Sir John and his 180 well-equipped men succeeded in compassing. The 'Prince Albert,' in having sailed right round North Somerset, demonstrated that it was an island, and not as it had been before supposed to be, an extreme point of land. To what did he attribute these great results? Why, simply to the fact that in his expedition he had carried

out the principle of total abstinence. They were not only enabled to travel when others were masquerading and conducting theatrical performances, but they also did that which other expeditions had not done—they travelled when they were deprived of the light of the sun. During 107 days they had only the light of the moon and of the stars; nevertheless, they travelled all that time.

"As Captain Kellet had said, there was no expedition in which a man could be engaged—warfare not excepted—which was of so trying a character as an expedition to explore the arctic regions. From the day on which the expedition set out till the day of their return they were exposed to one continued series of hardships and sufferings. From none of these had his crew been exempt. They had suffered the torments of snow blindness, and he, the only one able to see out of six, had to guide five who were totally blind. Also for many miles, of six, five had been afflicted with arctic lameness, the use of the left leg being for a time entirely taken away from them; and thus afflicted the company had to travel 200 miles, through snow and over blocks of ice, to the ship. During this time they had to subsist upon only a basin of gruel, served out every morning. From thirst, too, they had all suffered, there being no water, and they were driven to slake their thirst with snow or ice—ice that would not leave their lips till it had brought away part of *the skin*; and in this plight they had to munch their *hard* biscuits at night.

"The men, however, who volunteered to explore the arctic regions, partially equipped, and on temperance principles, were not the men to shrink at trifles. They met their difficulties like true men, and as such surmounted them. Different, he believed, from every other expedition, the 'Prince Albert' brought home all the men she took out. And when the crew landed at Aberdeen, experienced men told him they had often observed crews land from whaling and other arctic expeditions, but never saw a crew land in so admirable a condition as that which characterised the crew whom he had had the privilege to command, and who had not, during the whole of their cruise, tasted one drop of any intoxicating beverage."

Mr. Goodsir, surgeon to a whaling ship engaged in the same search for Sir John Franklin, names tea and coffee as "the whaling sailor's greatest luxury and comfort," and adds: "He (the sailor) has no objection to his grog; but I think he has long ere this found out that strong, hot tea or coffee—particularly the former—is by far the best beverage he can take in these climates." Among the many hundred American ships engaged in the whale fishery—which, some twenty years ago, exceeded 700, and were even then, most of them, conducted on the abstinent system—the same good results have been experienced. An intelligent man, about seventy, who for half a century had been a fowler—a pursuit whose success is greatest when the winter cold is most severe, owing to the larger number of birds that are thereby driven south—told Dr. Car-

penter that he would be out for a fortnight at a time without lying down, save in his boat, and hardly ever obtaining warmth from a fire; and yet he was remarkably hale and vigorous for his years. Being himself proprietor of a public-house, he had no prejudice against drink; and yet he strongly testified that even the moderate allowance of fermented liquor he allowed himself on ordinary occasions became mischievous to him when he was out fowling, in proportion as the weather became severe, and was then knocked off by him entirely; and he further declared that all the fowlers who had been in the habit of employing brandy with any freedom during these expeditions died off at an early period. The Rev. Richard Knill—a well-known and venerated name—long a missionary in St. Petersburg, stated at a public meeting, in flat contradiction to the delusion about spirits repelling cold, that when a Russian regiment was about to march, orders were issued over night that no spirits were to be taken on the following morning; and so strict were they in this matter that the humbler officials—answering to our corporals—were sent round among the men on the not very inviting duty of smelling their breath; and when any one was found to have been consorting with the evil spirit, he was at once turned out of the ranks for that day's march, as such indulgers had been found especially obnoxious to frostbite and other affections. On the contrary, an allowance of oil was given to each soldier, from its proved heat-giving qualities.

The most of the foregoing facts and testimonies we

have culled from Dr. Carpenter, either from his essay above-named, or from his tractate entitled, "The Physiological Errors of Moderation," a reply to an article entitled "The Physiological Errors of Teetotalism," which appeared in the *Westminster Review*, July, 1855. That reviewer, in his anti-teetotal crusade, must have been staggered beyond expectation in encountering facts of such harmonious, combined, and accumulative force, pointing, like a park of artillery, the wrong way for him; and that he really was, is practically confessed by the following significant concession:—"Dr. Carpenter is more cogent when he points out that alcohol is not, in the long run, so good a producer of heat and power as food. The sections of his work in which he examines the comparative merits of food and alcohol, in enabling man to sustain the extreme of cold or the demands of labour, are so rich in facts, and so important in conclusions, that it is with regret that we see them hampered by teetotal prejudices or vitiated by teetotal logic." This is very neatly put; but it can delude no intelligent reader. Dr. Carpenter has established, not comparison but contrast, between the things referred to as claiming to give heat and strength, and that by physiological principle, and by experimental evidence. It is interesting to recall, that a brief lustrum was all that elapsed thereafter till that same *Westminster Review* welcomed into its pages, in 1860, Dr. Carpenter's well-known and masterly article, presenting the remarkable results then reached by the Parisian experimentors—

Lallemand, Perrin, and Duroy—as to the *rôle* of alcohol in the human system.

In that able and animated paper to which we have already referred, entitled *Alcohol in the Arctic Regions* (*apropos* of the late expedition), Dr. Morton of Kilburn, among other illustrative cases, which we have not yet anticipated, states the following:—

"With the exception, perhaps, of Sir John Franklin, there can be no more distinguished names in the history of arctic exploration than those of Parry and Ross, familiar as household words in the mouths of the last generation. We still glory to think that 'Parry's farthest, 82° 45′,' attained in 1827, remained the world's farthest until the present year, when 83° 20′ were reached by the Markham sledging party. In Captain, afterwards Sir J. Ross's narrative, after describing how he induced his men on one of the sledging parties to forego the use of spirits after the first day, by representing to them that he was the only one who drank no spirits, and was also the only one who had not inflamed eyes, and that, although he was much the oldest of the party, he bore fatigue better than any of them, he goes on to remark: 'It is difficult to persuade men, even though they should not be habitual drinkers of spirits, that the use of these liquors is debilitating instead of the reverse. The immediate stimulus gives a temporary courage, and its effect is mistaken for an infusion of new strength; but the slightest attention will show how exactly the *result is* the reverse: it is sufficient to give men under

hard and steady labour a draught of the usual grog, or a dram, to perceive that often in a few minutes they become languid, and, as they generally term it, faint, losing their strength in reality while they attribute that to the continuance of their exertions.'

"The following passage, from a speech of Captain Sir Edward Parry, delivered in 1838, will show what he thought on the matter :—'There is another question,' he says. 'Are ardent spirits necessary? I say decidedly not. It is said they keep the cold out; I say they do not; they let the cold in. Few seamen have been more in the cold than I have, and I know that spirits do them harm. When we were in the cold, what did we do? We ordered the cook to get some boiling water and make tea and coffee; the men took that, and it did them good. There may be cases of exhaustion where spirits are needed as a medicine, but as an article of diet they do ten thousand times more harm than good.' In a later passage of the same speech he speaks of Sir John Franklin as taking up the temperance cause, so that I think we should not be far wrong in assuming that he too had come to the same conclusions. The sad fate of the expedition which left our shores in 1845 forms a dark page in the history of arctic exploration; but it is relieved, as far as it may be, by the gallantry and perseverance displayed in the efforts made for his rescue, and by the brilliant indirect results attained. No less than twenty various expeditions for this purpose were despatched from this country and from the United

States, and from seven of these we derive evidence, in some instances of the very strongest kind, against the use of alcohol. I will take those first of which I have been able to hunt up the scantiest notices. Perhaps the most brilliant of them all was that under Captain M'Clure, who closed an epoch of exploration by discovering the North-West Passage, the ideal goal of those days, as the North Pole is of ours. In a recent article in a medical paper on the highly important question of arctic scurvy, I find the remark that 'the use of spirits by sledging parties in the extreme cold has been on many occasions found to be prejudicial to the working powers of men and officers, *tea being adopted by general consent in M'Clure's expedition* (in which scurvy was kept at bay for years) *as the most refreshing and invigorating beverage.*'"

As strikingly corroborative of the fatality attendant on a resort to spirits against cold, we add a graphic testimony from one of the medical journals, in 1871: "We (*Lancet*) extract the following from a paper entitled 'Oinology,' in the *Cincinnati Medical Repertory*, by S. E. M'Kinley, M.D. A group of men, twenty-six in number, some years ago, travelling over a western plain, on a track but dimly visible by day, lost their direction when overtaken by darkness. The weather, very cold during the afternoon, became more so as night advanced. Though well provided with food, clothing, and an abundance of whisky, they had no wood or other fuel to make a fire. The occurrences of the night are given in the language of the

only physician who accompanied the expedition. He was a man of good, strong, hard sense, with quite creditable medical attainments, considering the limited opportunities he had for securing them, which consisted in reading the domestic practice of Gunn, Ewell, and Thomas. He knew no more than their books could convey; but, to his credit be it spoken, he knew all they could impart. He had only heard of, but had never seen a Medical College. Addressing the men, he said,—

"'As we can't get wood, boys, we must keep warm, or at least alive, through the powers of *Madam Vis Medicatrix Naturæ*. She is all right in any weather, if we don't clog her up and pucker her forces. If I have got any medical knowledge at all, I am going to use it to-night, and the first thing I begin with is this: I am as fond of whisky as any man dare be; but, by the gods, the man that gets drunk to-night to keep warm won't see daylight. When the great God of the universe made man the boss workman of the earth, he made all other things first, and the elements too, not to rule over him and to kill him, but to *hunker* down to his wants. But, boys, whisky was *scored* out of that bill of fare. The *vis medicatrix naturæ* is the highest of all other things, and if she ain't *splintered* up by our own d—d folly, she will ride safe through any storm. We have got to keep stirring round or huddle up in the straw of the waggons as many of us as can cram in together. Each one will keep the other warm. We must all eat as much as possible, but whisky ain't

the thing.' . . . This is what I told them all; but very few minded me. I didn't taste a drop, nor did Carter or Finley. We then huddled in together on the straw in the bottom of our waggon. We took off our boots and overcoats, and then got on the straw, and put our blankets over us, and our overcoats on the top of them. We were only cold, but did not suffer or freeze. Clark, Reily, and Tanner were very cold, and we heard them yelling nearly all night. They suffered very much, but were not frozen; they drank very little whisky, but they took several *thin drinks* in the run of the night. Seven other fellows that drank a good deal had their toes and fingers scorched, but they got over it in a few weeks. Six of the boys that drank pretty strong were badly frozen, and never got over it; and four that got very *boozy* were frozen so badly that they died three or four weeks afterwards. But Hutchinson, M'Elroy and M'Alpin were stiff dead by daylight. They got dead drunk; and as they did not make a fuss, the other boys thought the whisky was keeping out the cold, so they drank the stronger. I tell you, sir, they all suffered just as they took in the whisky; those that got drunk froze dead; those that drank less, but too much, died after a while; those that drank only moderately will feel it as long as they live; and those that took only thin drinks, were well nigh *shut up*. We three didn't drink any. The *vis medicatrix naturæ* brought us through. These men were all Americans; their ages ranged from twenty-three (M'Alpin), the youngest, to forty-one (Carter), the

oldest of the group. All were equally well provided, each having two blankets. All were in the bloom of life, in the best of health, and ready to encounter, and able to overcome, the hardships inseparable from a frontier life."

11. *Recent Arctic Expedition.*

It is, however, time to return to the arctics and take note of the results, for our present inquiry, of the recent expedition to the pole. It had some calamitous issues. Scurvy broke out among the crews, to which, and to the polar rigours, one of them succumbed. This occasioned a widespread feeling of deep and painful regret. Considering the precautions used, it was inevitable that experienced men should be curious to know the reason why. To this sentiment prompt and decided expression was given by Dr. Edmunds, in a letter to the *Times*, which opens thus:—

"The fact of this splendidly-equipped expedition having been crippled with scurvy takes us by surprise, and demands a searching inquiry as to its cause. The problem of protecting from scurvy the brave fellows who man our ships ought no longer to be left unsolved, and one cannot but hope that an investigation of its origin in this expedition will clear up the subject, and teach us all such lessons as have yet to be learnt."

He then refers to the ample facilities that surrounded their winter quarters for obtaining fresh food; after which he thus resumes:—

"I venture to call attention to what may prove to have been one fact in the development of this disease. In the *Times* of Tuesday it is stated that so soon as the sun had gone for the winter 'the men had an extra glass of grog served out to them,' and from another part of the narrative it appears that 'molasses and rum' were administered to men suffering from scurvy in the spring. I venture to aver that this practice is in the teeth of all that we know in general as to the scurvy-producing qualities of alcohol when taken at all continuously. No class of men suffer from purpuric diseases so much as regular spirit-drinkers. The experience, moreover, of all arctic voyagers seems to be so definitely against the use of alcohol for men who are exposed to cold, that these points in the narrative must have been read with surprise by all whose attention has been called to the subject. If, indeed, the men during the monotony of a long and inactive winter, were allowed to rely not merely upon grog, but upon 'extra grog,' I venture to say that the development of scurvy so soon as the spring returned, with its active labour and severe exposure, is no longer a mystery."

This seasonable utterance was directly followed by another, no less potential, from one who had much experience, and gained much distinction, in arctic exploration. Writing to the *Times* from the Scientific Club, Dr. John Rae says:—

"In the *Times* of Thursday there are some admirable remarks on scurvy by Dr. James Edmunds,

Medical Officer of Health for St. James's, which my experiences fully endorse. As none of the crews of the ships, notwithstanding their double allowance of grog during the winter, were attacked with this terrible disease, it may be supposed that the regular ship's rations were sufficient to preserve health; we must, therefore, look for something in the diet of the sledging parties as a cause of the malady. Nor is this difficult to find if the programme of rations for the sledge journeys as mentioned before the ships left England was observed. As far as I can remember, salt was added to the pemmican when being made—a most unwise, useless, and injurious addition—against which I offered some remarks at the time. We have, therefore, pemmican salted, bacon cured with salt, and rum, as the chief part of these rations, and a better combination for the production of scurvy, particularly after the systems of the men had been, as it were, prepared for its reception by a five months' double allowance of grog, could scarcely have been imagined, and to counteract which only a very small allowance of preserved potatoes was issued. Condensed milk, an admirable anti-scorbutic, does not seem to have been thought of. I once had seventeen cases of scurvy among the crew of a vessel (some thirty-five in all), when forced to winter in Hudson's Bay, and all the men who were severely attacked were fond of grog. The more temperate either escaped wholly or were but slightly affected, and the only two that died were of intemperate habits."

In another letter, in the *Morning Advertiser*, Dr. Rae thus further vindicates his opinion :—

"I may mention that I am not habitually a total abstainer from the use of wines and spirits, although I, as well as my five fellows, were so—not from necessity but choice—on all the arctic expeditions in which I was engaged. Although now about a quarter of a century older, were I going on another arctic expedition I should again be a teetotaler, so perfectly am I convinced, after many years' experience, of the bad effects of alcoholic drinks in a cold climate. Having no experience of their effects in temperate or warm countries or seas, I do not offer an opinion, leaving this to others to decide. You further say 'that alcohol appears to have been the only article of the arctic sailors' diet which had any decided anti-scorbutic properties.' If this were true, and that the lime-juice, preserved vegetables and fruits on board the ships, and served out as rations, had no 'decided anti-scorbutic properties,' how does it happen that in former times—not many years ago—when rum formed a part of the daily ration on board almost every British merchant ship, scurvy was far more prevalent than it now is, when the use of spirits is almost entirely done away with on board those vessels? If fruits and vegetables are not anti-scorbutics, how can it be accounted for that fifteen out of seventeen cases of scurvy—some of them very bad indeed—which occurred amongst the crew *of a ship* of which I was surgeon, recovered without

the aid of either fresh meat or alcohol, by the use of cranberries alone, which we found as soon as the snow went off the ground in spring? I may add that the two fatal cases of scurvy, out of the seventeen named, occurred *before* the snow cleared away from the ground, and consequently before the cranberries were found."

It is now time to advert to the little knot of noble fellows who dared to confront the icy rigours of the pole mailed in the well-tried armour of total abstinence. Sir George Nares generously alludes to them and their gallant services, pronouncing Adam Ayles "as fine a fellow as ever stepped," and acknowledges the "valuable services" of another abstainer, James Self, who accompanied Lieutenant May to the relief of the western expedition. In his official report Sir George says,—"It was principally due to their incessant labour that the party arrived on board before the rapidly advancing disease had further developed itself." In regard to the spirit ration, Sir George gave the following information at the dinner in Portsmouth, got up in honour of him by the mayor:—

"Instead of the ration of spirits having been increased in the late sledging expeditions beyond what was allowed in those splendid journeys of over 1,100 and 1,200 miles of Sir Leopold M'Clintock, Admiral Richards, and others, the ration was reduced from two-thirds of a gill to one-half (not quite a wineglassful), and this was only drunk just before retiring to rest, and never whilst the men were travelling. The

rum saved by the teetotalers, and in consequence of sickness, was carefully kept for fuel, or stored in the depots, and was never carried by any one else."

He added that the tea ration was doubled; and he thus describes the salutary effect of the change in p. 54 of his official report:—

"Each sledge carried extra tea in lieu of the usual mid-day allowance of spirits. Both men and officers were unanimous in favour of the change, and willingly put up with the misery of standing still in the cold with cold feet, during the long halt needed for the purpose of boiling the water; and all agreed that they worked better after the tea-lunch than during the forenoon."

It is almost too obvious, and yet there is some need to remark, that no hard-and-fast line can be drawn between the effects of total abstinence and those of its opposite, in the mechanical sense of taking account of the result, man by man, and striking a balance. Any number of specific causes might here intervene to upset such a calculation. It is clearly on general grounds, and only by accumulated experiences, that such a question can be determined. Further, even could it have been demonstrated that alcohol was in some respects beneficial in those high latitudes, that would have been no passport for its acceptance in more ordinary circumstances. We make these observations simply to guard ourselves against the suspicion of unreasoning fanaticism—as if total abstinence must needs work miracles at all times and on all hands. Certainly, we have no

need of any such proviso to cover shortcomings or failures on the temperance side of the late experiment; for it has, to an extent not more gratifying than amazing, redounded to the triumph of teetotalism with marked precision, even on the strict comparison of man with man, not only of drinker with abstainer, but of the less persistent with the out-and-out abstainer.

The special correspondent of the *Temperance Record*, writing from Portsmouth, November 28, thus describes the abstaining brotherhood of the expedition, and details or sketches their trials and triumphs:—

"So far as we can ascertain, the number of old and tried abstainers who went out with the expedition were six—viz., William Malley, Adam Ayles, William Gore, Joiner, and Self of the 'Alert' (Captain Nares); and Henry Petty of the 'Discovery' (Captain Stephenson). There were two or three other seamen who joined the temperance cause during the commission, and it is only fair to state that the novices suffered from scurvy like the rest of the crew. Ayles, Malley, Gore, and Petty were Good Templars, and, with the exception of Gore, remained staunch to their colours until the end. Joiner had been an abstainer for eight years, and Self for twenty-one years, but neither were Good Templars, and both, unfortunately, took to drinking during the toilsome sledge journeys. Nevertheless, the only men belonging to the 'Alert' who did any sledge-travelling worth speaking of, and who enjoyed a perfect immunity from scurvy, were Malley, Ayles, Joiner, and Self. The rest, including Gore,

who was severely punished for his recusancy, suffered greatly from disease and exhaustion.

"Amongst those who accompanied the supporting sledges under Dr. Moss and Mr. White were Malley, Gore, Joiner, and Self, the two former being fully resolved to put their principles to the test. The experiences of Malley have already been in part recorded. He was not employed on any long journeys, but was repeatedly out with parties under Moss, May, and Giffard, who were entrusted with the duty of forming depots, opening communications with the advanced parties, and acting as supports. He states that the sledging parties from the 'Alert' suffered greater privations than those from the sister ship. They had pushed beyond the limit of animal life, and their supplies of rein-deer and musk ox were soon exhausted. They were consequently obliged to subsist entirely upon the ship's stores, and this enforced abstinence from animal food made them in a special degree susceptible to scurvy. On the termination of the sledging duties at the end of July, the abstainers found that they had surpassed the remainder of the 'Alert's' crew in the number of days' sledging performed. On this occasion Ayles had been out 110 days and Malley 98; 'and it is a remarkable fact,' the latter remarks, 'that neither of us were attacked by scurvy, but enjoyed good health, and were only weakened by our arduous duties in sledging work, which is, undoubtedly, the hardest work ever imposed *on man.*'"

It thus turns out, that in the hardest of all hard races, and in the extremest cold ever experienced by man—for the temperature noted, which reached its climax at 104 degrees of frost, or 72 degrees below zero, far exceeded in rigour that experienced by any former navigator—the teetotalers were among those who underwent the greatest exposure and fatigue, and not only held their own, but one of them, Ayles, carried off the honour of champion sledger, having been out more days than any of his comrades. He was out not only 110 days sledging, but on one occasion he was no less than 84 days absent from the ship at a time. That was when Captain Nares, on hearing of the breakout of scurvy, and specially concerned about the western party, despatched Lieutenant May with the dog-sledge to meet them. In the words of the correspondent above quoted—

"Assistance came just in the nick of time, in fact, on the last day that many of them were able to travel. Scurvy had attacked the party, and had gained on them so suddenly that, with the exception of Lieutenant Aldrich and Ayles, who is a second class petty-officer, the whole of the men (seven in number) were in a helpless condition. The legs of the men were hard and swollen about the knees, so that they could scarcely move them. The indent of a finger upon the flesh was visible for weeks. Doidge and Mitchell still managed to struggle by the side of the sledge; but the other four invalids, who had held out until the last moment, were obliged to be carried. We have already

stated that of the two who were free from scurvy Adam Ayles was one. The other was Lieutenant Aldrich, who, although not an abstainer, we have the authority of Ayles for stating, was next door to one. He diluted his rum more than any other member of the expedition. Ayles says he was out with Mr. Aldrich in the previous autumn, and that he was out with Mr. Egerton eight days in the spring for the purpose of bringing back the two boats which Commander Markham had left some fifteen miles from the ship during the autumn. Gore was with him for twenty days out of the eighty-four. During the whole of these sledge journeys he ate and slept well, and bore the cold even better than those who were accustomed to take stimulants. Their first meal, termed breakfast, though it sometimes took place at night when sledging, consisted of cocoa and biscuit and pemmican. Five hours afterwards they lunched off bacon and biscuit; and for tea, or supper, they had tea and biscuit and pemmican. The latter they made into stew, mixed with 'stubbs' or preserved potatoes, and seasoned with onion powder or curry, both being admirable anti scorbutics. The rest of the party had a double allowance of grog, forty-five above proof, before turning in. They also smoked a great deal; but for his part, Ayles says, he neither drank nor smoked, and he took care that his allowance of grog was stopped on joining the ship. Twice a week there was beer served out, which was considered a great luxury, as it occupied much room in the travelling, and was dealt out very spar-

ingly. He was never in better health in his life than at the present time."

The *Good Templar's Watchword*, after recalling the parting ceremonial over their brethren on the eve of starting for the pole, and the solemn prayer then presented on their behalf, thus proceeds to give some account of the brave fellows. We must restrict ourselves to the following sketch of the champion :—

"We are now pleased to record the fact that God has answered our prayers, that we have these brave brethren back with us once more; and at our last District Lodge Session, Nov. 21, four silver medals were ordered to be prepared for presentation to them in commemoration of the great service they have rendered to the cause of temperance. Brother Adam Ayles is a native of Dorset, and was born in the year 1850. His parents were total abstainers, and he, a life abstainer, boasts of not having a drop of alcohol in his system. He joined the navy when quite young, has served on various ships, is a first class petty officer, and has filled the post of commander's coxswain. He is a very intelligent brother, kind in words and good actions, fearing the Lord and loving his fellow-man. He had no fear for his principles when he started, saying he was determined, live or die, to put them to the test. He sailed in the 'Alert,' and was the only life abstainer in the expedition. Since his return he tells me he was one of a party of seven with Commander Aldrich, who did 110 days sledging; five of the party were struck down with

scurvy, and Brother Ayles and Mr. Aldrich alone left to drag them back to the ship. The officer at last said, 'Ayles, for God's sake, take some spirit, or we shall be all lost!' Our brother replied, 'No; I promised my mother when a boy never to touch it, and if I perish in this ice I will keep my word.' He did, and never suffered from frostbite, scurvy, or any other sickness. Each man had a design painted on canvas on his back to attract the attention of those following, and prevent snow blindness. Our brethren had the Grand Lodge Seal of the I.O.G.T.; the one who went the farthest was to leave his behind. Brother Ayles accomplished this feat, and buried the seal in a cavern nearer the North Pole than any other human being has yet gone."

The Good Templars of Portsmouth, who gave them so touching a farewell, greeted them on their return with no less hearty a welcome. Ayles was not present, owing to a bereavement in his circle, but was to appear on a future occasion to give them a scrap from his journal. Malley did effective duty by reading a graphic account of their doings, darings, and diversions, including the "Royal Arctic Theatre, positively for the first time." He remarked that "Dr. Colan, of the 'Alert,' speaks highly in favour of temperance, and told us he would do so in his report to the Medical Department."

This satisfactory experience of the abstaining seamen only whetted the desire for special inquiry into the case of their less fortunate companions, and much dis-

cussion ensued, in which Dr. Rae again did yeoman service. The *Lancet*, of November 11, had said,—

"It is proper to record our disagreement from Dr. Rae and other writers, who have declared in effect that alcohol promotes rather than prevents scurvy. Alcohol is undoubtedly an antiscorbutic (though not perhaps a powerful one), and was so considered by no less a man than the late Dr. Parkes, who, of all men, was very little disposed to recommend it either as an article of diet or a medicine. But it is no argument to record that the hard drinkers of a company were the chief victims to scurvy, inasmuch as they would have first succumbed to any other climatic or dietetic disease. This by the way. Rum is certainly in sledging expeditions not the best antiscorbutic, for, to paraphrase Dr. Colan's remarks at Portsmouth last year, 'it frequently becomes in severe weather as thick as treacle, and is then little better than cold poison.'"

Certainly "not the best antiscorbutic." Happy rum! to be reprehended in such gentle terms! But let us hear Dr. Rae in reply. After some preliminary explanations, in the course of which he states that he had an experience of something like twenty winters in the arctic regions, with temperatures varying from 10 degrees to 50 degrees below zero, he thus proceeds:—

"When I first lived in these cold countries, and took long walks, sometimes of forty or fifty miles, on snow shoes, I occasionally carried with me a small flask of *spirits*, according to the then prevalent custom

when shooting in the Highlands of Scotland. I never used the spirits but twice, and on both occasions, though not far from home, I thought I never should have got there. The quantity taken was small, not above half a wineglassful, yet the very brief temporary stimulus was speedily succeeded by languor, faintness, and drowsiness, which I could with great difficulty shake off. I was then a healthy and moderately active young fellow of twenty-one, not easily reduced to the condition I have mentioned.

"In many subsequent winter journeys over snow, extending to thousands of miles, I usually carried in my canteen a flask of brandy as medicine, and often as an experiment offered my men (old experienced travellers) some of it during the day's march. They, although fond of grog, invariably refused, asking leave to have it before going to bed, knowing that it would not then be so injurious. I observed, however, that the men to whom it was given were generally much more thirsty than the others, and not so well up to their work, during at least the early part of the next day.

"It may be asked, What has all this to do with scurvy? My reply is, that it has a great deal to do with it. The facts I have mentioned must, I think, be admitted to indicate that a continued use of even small quantities of alcohol in very cold weather has an injurious effect in causing a greater or less loss of vital energy or vital power, without producing any compen*sating* benefit that I am aware of; such loss of vital

energy must lessen the resisting powers of the constitution to the reception of scurvy, other conditions being favourable to the attack of this insidious disease."

The *Lancet*, to do it justice, though not without a fling at the temperance party for overdoing their contention—a visitation which that party can bear in the best of humour—was not long in assuming a much more satisfactory tone in regard to the influence and use of alcohol. In its impression of December 2, looking from the physiological point of view, the *Lancet* makes many important observations, which are wound up as follows:—"We entirely concur with those who maintain that alcohol, except as a medicine, is unnecessary, and practically useless in warding off the ill effects of cold. Its habitual use, as we have indicated above, renders men less able to withstand the exhausting effects of protracted exertion, and so renders them liable to scurvy, in common with many other diseases."

This agitation led to a special inquiry, which articulately ascribed the outbreak of scurvy in the sledging parties to the keeping back of the lime juice to leave room for rum. This withholdment was all the more reprehensible considering the express instructions given by Sir Alexander Armstrong, head of the Naval Medical Department, on the outset of the expedition. The sum and substance of these instructions were—Plenty of good food, constant occupation, regular compulsory allowance of lime-juice, and no spirits. Even

in extreme emergencies, when it might become necessary to recruit the men after great or unusual fatigue, Sir Alexander strongly urged the superiority of cocoa or tea over spirits, emphatically declaring that, in his opinion, the use of the latter should be abandoned. What fluids did the arctic commander furnish his sledging parties with? Abundance of rum, and no lime-juice. Need we wonder that scurvy broke out? And Sir Alexander Armstrong's paper of instructions foretold, with prophetic accuracy, the very results that did actually arise from the neglect to follow his counsel. Medical men are frequently accused from temperance platforms, and we are bound to say not without justice, of inciting patients with total abstinence proclivities to drink; but in this instance, even the most rabid teetotaler must admit that the medical profession took a noble and decided temperance stand. Surgeon Colan, the principal medical officer to the expedition, testified that, though his opinion had not been asked, the moment he found out that Sir Alexander Armstrong's instructions had been disregarded, he spoke to Commander Nares on the subject, but received for reply that lime-juice could not be sent with the sledges unless other things most essential to sledging were left out. Only one case of scurvy had occurred amongst those who stayed on board ship, and the subject was a man of intemperate habits. Surgeon Colan further stated, that if, in any future sledge party, essential importance must be attached to weights, rum ought to *be left* behind and lime-juice carried instead. We

have thus the clear and unmistakable testimony of the highest naval medical authority, and the medical head of the recent expedition, to the uselessness and danger of alcoholic liquids in extreme cold; and if any of our readers are contemplating a trip to that perpendicular ornament of the earth, the North Pole, we would strongly urge the absolute necessity of their adoption of the advice of both Sir Alexander Armstrong and Surgeon Colan—no spirits, but plenty of lime-juice.

12. *Under Mental Exertion.*

The principles involved in the previous cases of bodily exertion apply here with greatly augmented effect. Besides that the brain, equally with all other parts, needs to be invigorated by food and rest, it is the organ into which alcohol strikes its venomous fangs with special directness and malignity. For a few excited moments, indeed, brilliancies and piquancies flash forth from the beleagured organ; but these are at best signs of distress, and soon subside. Whoever wants, by a short and easy method, to divest his thinking of all clearness and balance, let him apply to the bottle. Bacchanals themselves will tell you that "if any pain or care remain, they drown it in the bowl." They seek escape from unwelcome thoughts by knocking thought on the head. A well known member of Parliament (the late Mr. W. T. Lyndsay) informed us, a few years ago, that when he had any motion or debate to take part in, he took

care to act the rigid abstainer, and do his work in the House on the strength of water or tea. Lord Palmerston, at a great feast in the Mansion House, naïvely stated that he and his fellow-ministers had to keep to a much more simple and frugal regimen, else woe to their work!

Dr. Yeo, in a late article in the *Fortnightly Review*, affirms that some of the best productions of genius have been written under alcoholic inspiration. We strongly demur to this statement. We are not forgetful of what is said of Byron and of old Æschylus on this head, but even here we desiderate proof. "Briefly brilliant" spurts there may be, as the narcotised brain plunges towards chaos, but aught more we should regard as a libel on our mental as well as moral nature. The editor of the *Contemporary Review* (for April, 1877), alluding to Harriet Martineau's refusal to take hock at her physician's recommendation, propounds much safer doctrine. "It may be safely affirmed," he says, "that no purely conscientious writing was ever produced under stimulation from alcohol. Harriet Martineau was one of those workers who could not write a paragraph without asking herself, 'Is that wholly true?' Writing like that of Wilson's *Noctes*, or Hoffman's madder stories, may be produced under the influence of wine, but 'stuff of the conscience' not." Nor could many parts even of the *Noctes* have been so written.

Here testimonies from literary and professional men crowd in upon us like an avalanche, amid which we

would humbly include our own. Of our life-long work, such as it has been, not the half, nor yet the half of that half, was ever likely to have been got done except on the strength of total abstinence. Out of multitudes more take the following, partly as lying to our hand, and partly as the testimony of a "physician," who thus records his personal experiences in a recent number of the *British Medical Journal* :—

"When a young man I was very delicate, and from nineteen to twenty-three years old seldom free from some ailment, due to general weakness. As I was a firm teetotaler, my convictions became a source of dispute with my friends, and, under the orders of two medical advisers, I sacrificed my own preferences by taking a daily quantum of sherry; and subsequently I was in the habit, until the summer of 1875, of swallowing my dose of beer or wine with each day's dinner. So far, however, from being secured by this in the enjoyment of health, I have always had excessive sensitiveness to atmospheric changes, and have again and again been laid up for two or three weeks at a time. Two years and a quarter since I resolved to drink nothing stronger than good filtered water, except a morning and evening cup of tea. The result is that indigestion, headache, sleeplessness, and fear of weather are all things of the past. Not only have I had splendid health, but now, at fifty-four years of age, I have more energy than I had at thirty, and I can do a day or a night's work, or a succession of them, with any man you please."

Conclusion.

At this point we must abruptly end, at the sacrifice of much additional matter, and of almost everything in the shape of moral. We have overdrawn our account on space to the last permissible limit. But for this, our next chapter (fully prepared) would have presented an ample digest of Dr. Richardson's investigations and teachings, according to the purpose we indicated in a preceding page.* As it is, we must content ourselves with the summarised results as there presented. We meant also to have entered somewhat on the pathology of intemperance, tracing the course of alcohol through the organs, and specially touching on the momentous point of hereditary transmission; also on the dipsomaniac problem, and pending legislation on the subject; and on various other topics embraced in the medical aspects of the temperance question. Some of these points, though connected with our present subject, are not strictly included in it. The field we have traversed is a somewhat wide one, and will be found to comprise, in a sort of progressive unity, the leading heads of temperance physiology.

The foregoing discussion, if it has hit its aim, will convey its own pervading moral. That moral is—*Abstain.* Tamper not with the laws of your organic being. These, in so far as they are clear to you, and in so far as they involve your own free action, are to you moral laws. "Do thyself no harm;" "Thou

* See page 137.

shalt not kill;" "Put no stumbling-block in thy brother's way;" "Avoid every appearance of evil;" "Whether ye eat or drink, or whatsoever ye do, do all to the glory of God." These and such as these are mandates of ever-during and self-manifest obligation.

Total abstinence is *sure;* for no man ever becomes a drunkard so long as he abstains from drink. Total abstinence is *safe*, even if you have soaked yourself long; witness highest medical authority, and witness our gaol birds, who, as the cell-key turns upon them, make a sheer leap into total abstinence, and there lie arm in arm with it, and find that leap to be the most wholesome exercise, and abstinence the best bedfellow they ever had in their lives; as they quit their durance vile in a condition heavier, heartier, and healthier than they entered; though, too often, as they regain their liberty, they dismiss from their side their best ministering angel. Total abstinence is *politic*, it is one of the best passports to success a young man can have; for the days of anti-teetotal sneering are for ever gone, or, should the pretence still remain, set it down as insincere, and as disguising a very profound respect for you in the scoffer's heart. And total abstinence is *Christian*. It is, or ought to be, a pure dictate of the gospel law of love, that love which was incarnated in Him "who pleased not himself," but lived and died for his very foes. You claim Christian liberty? you do well; and who in such matters may presume to judge you? but as you would wear the name of Him who is incarnate, self-sacrificing Love, see well to it that you

use not your liberty as an occasion of stumbling to others. To close with a few sentences we have used elsewhere: It was on this very principle that Paul nobly exclaimed,—"It is good neither to eat flesh, nor to drink wine, nor anything whereby thy brother stumbleth, or is offended, or is made weak." "When ye sin so against the brethren, and wound their weak conscience, ye sin against Christ. Wherefore if meat make my brother to offend, I will eat no flesh while the world standeth, lest I make my brother to offend" (Rom. xiv. 21; 1 Cor. viii. 12, 13). This was the very spirit the great apostle drank in as he stood before the cross on which the "One died for all," and judged, and inferred, till his whole soul was kindled into a Christ-like glow of self-sacrifice. We are sometimes reminded that the kingdom of God is not "meat and drink"—very needlessly; for this we not only know, but are careful not to forget—there being no fitter or finer sanction for our total abstinence procedure than this very text and context. For how do they run? "Let not your good be evil spoken of; for the kingdom of God is not meat and drink, but righteousness, and peace, and joy in the Holy Ghost. For he that in these things serveth Christ, is acceptable to God and approved of men. Let us therefore follow after the things which make for peace, and things wherewith one may edify another. For meat destroy not the work of God. All things indeed are pure; but it is evil for that man who eateth with offence. It is good *neither to* eat flesh, nor to drink wine, nor anything

whereby thy brother stumbleth, or is offended, or is made weak" (Rom. xiv. 16-22). It is on no ascetic principle that we abstain, knowing well, as the Apostle teaches us, that the kingdom of God is not to be attained by any such worthless means. It is on the very principle Paul here avows in contrariety thereto, as having led him to abstain in the case he names, that we too abstain,—viz., of loving consideration for the weak and fallen, not to lay a stumbling-block in their way, and to seek to raise those who are wallowing in the mire. There never was a more gigantic snare to human souls or obstruction to God's gospel than the drinking system, and therefore never a more urgent call to imitate the Apostle in his noble example of self-sacrificing love. There is no lovelier or more characteristic feature of the Lord Jesus himself than his sympathy with the little ones, and his compassion for the fallen. We are not, indeed, to enslave ourselves to the frivolous whims of some who are morbidly fertile of scruples, and never without their difficulty; but there are many ingenious though weak brethren who have a tender claim in Christian love on our self-denying consideration. Not our strength but their weakness, nay, in some cases, their very scruples, must rule our action; *how*, and in what measure, each must be left in his Christian liberty to determine.

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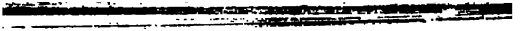

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